June 1, 2011

Mr. William Skalitzky 154.002.009
Alliant Energy Corporate Services, Inc,
4902 N. Biltmore Lane
Madison, WI 53718

Re: Ash Pond Slope Stability and Seismic Analysis - Supplement
Burlington Generating Station – Burlington, IA

Mr. Skalitzky;

With this report, Aether DBS (Aether), supplements the findings from our February 3, 2011 "Ash Pond Stability and Hydraulic Analysis, Burlington Generating Station" report. In the February 3, 2011 report, Aether found that the stability of the Economizer Ash Pile did not meet a minimum acceptable factor of safety under both static and seismic loading; and that the Main Ash Pond fell below the seismic loading acceptable factor of safety used by the United States Environmental Protection Agency (EPA) for Coal Combustion Residuals (CCR). In addition, soil information available on February 3, 2011 indicated that native soils immediately below the CCR may be subject to liquefaction during an earthquake of International Building Code design intensity.

To extend the knowledge of soil conditions at the CCR facilities, Aether recommended that Interstate Power and Light consider collection of additional data on the strength of the CCR and native soils immediately below the CCR using in-situ testing methods. The work was authorized in April 2011 with the data collection occurring between May 9 and May 16, 2011.

Means and Methods for Data Collection

Certain soils may have zero effective stress (liquefaction) during an earthquake or from static shear of a saturated embankment slope. Soils that will liquefy include loose or very loose uniform fine sand or silt, and soft low-plasticity clay. The liquefaction resistance of a soil is based on its strength and the effective confining stress (pressure from the self-weight of the soil). The resistance may be tested by obtaining samples of the soil and testing the soil in the laboratory by the cyclic triaxial test (ASTM D 5311). Since soils that have low resistance to liquefaction are difficult to sample in an undisturbed condition, the laboratory test is usually run on a reconstituted sample and often does not reflect the in-situ conditions. Because of this limitation, Aether recommended that the strength of the CCR and soil immediately below the CCR be measured with a Cone Penetrometer Test (ASTM D 5778) which collects a continuous measure of soil strength with depth.

The Cone Penetrometer Test pushes a standard dimension cone into the soil on a continuous basis followed by a sleeve that is advanced separately behind the cone. In addition to the pressure required to advance the cone and the sleeve, the pore pressure at the cone tip is measured by a pressure transducer. The cone, sleeve and pore pressure transducers are calibrated in accordance with ASTM D 5778 and the data is collected continuously with stops only to add additional drill rod to the pushing string. The rods were added every four feet and the pauses required for these rod additions are sometimes evident in the data (i.e., a pore pressure decline). The Cone Penetrometer test is correlated to soil borings or samples recovered to calibrate the observations of the Cone Penetrometer. The calibration borings also produce soil samples for laboratory testing to determine the basic soil properties needed to confirm soil classification in accordance with the Unified Soil Classification System (ASTM D 2487).

The additional May 2011 investigation was made to accomplish three purposes:

1. Determine if a clay berm was present in the eastern 500 feet of the north embankment of the Economizer Ash Pile.
2. Determine the soil strength properties for the embankment soils and the native soil present under the embankments.
3. Determine the susceptibility of the embankment soils and the native soils to liquefaction and the cyclic resistance strength of the soils that are susceptible to liquefaction.

The proposed investigation included the installation of 21 Cone Penetrometer probes. The probes include two series of cross-sectional probings of the eastern 500-feet of the Economizer Ash Pile to determine if a clay berm is within the CCR. The remainder of the Economizer Ash Pile was probed only from the centerline of the visible clay berm. In addition to the Economizer Ash Pile, more Cone Penetrometer probes were advanced on the berm centerline of the Ash Seal Pond, Main Ash Pond, and Upper Ash Pond. After completion of the Cone Penetrometer probes, geo-probe locations were selected for correlation with the cone penetrometers in effort to collect soil samples at locations where it was determined that liquefaction susceptibility was questionable and Unified Soil Classification parameters were needed to clarify the Cone Penetrometer results.

The goal of the Cone Penetrometer testing was to advance the penetrometers into the dense sand layer that is present starting at approximately elevation 510 feet. Soils at the site below that depth are not liquefaction susceptible and do not impact the stability of the CCR impoundments.

Investigation Activities

The conditions of the CCR impoundments presented in the February 3, 2011 report show that the CCR is placed over a native soil that was deposited by flooding of the Mississippi River. Near the river at the Ash Seal Water Pond, the native soils are characterized by coarser natural levee soils. Regardless of location on the property, a dense sand layer begins at approximately elevation 510 and becomes coarser and denser with depth. The dense soil is not the focus of the additional investigation and is an indicator of reaching the depth of interest.

Previous site soil information is presented in the February 3, 2011 report and is not repeated herein.

The CCR and soil data collected in May 2011 includes Cone Penetrometer Tests (CPTs), Geo-Probe samples for correlation, and soil testing of geo-probe core sections. Locations of the CPTs and geo-probes are indicated on Figure 1.

The CPT equipment conformed to ASTM D 5778-95, Standard Test Method for Performing Electronic Friction and Piezocone Testing of Soils. The electronic measurements collected include cone-tip resistance, sleeve friction, and pore pressure output in pounds per square inch (psi). The results are recorded at depth intervals of approximately 0.5 centimeters at a standard cone penetration rate of 2 centimeters/second. The CPT provides continuous, real-time output of soil lithology data over the full depth of the embankments, through the native soils, and stopping in the dense sand when the CPT probe could not be advanced further. The data was viewed graphically as the CPT probe was advanced through the CCR and native soil. A total of twenty one (21) CPT probings were completed in May 2011. The data plots from the CPTs are provided for each location in Attachment A.

The CPT data plots were observed real-time in the field to determine where native soil or CCR may be susceptible to liquefaction. Geo-probe samples were collected at the chosen locations and soil samples recovered from the geo-probe sleeve. The geo-probe borings were logged in the field in accordance with the Unified Soil Classification System (ASTM D 2487). Field characterization of the geo-probe borings included evaluation for the presence of saturation and the use of a pocket penetrometer on cohesive soils for estimates of unconfined compressive strengths recorded in tons per square foot (TSF). A total of twelve (12) geo-probe borings were completed as part of the extended soil investigation. The geo-probe boring logs are provided in Attachment B. A summary of the Unified Soil Classification and soil consistency adjectives is provided with the geo-probe borings in Attachment B.

Using the CPT data and geo-probe boring visual classifications, specific sections of the soil cores were recovered for index testing. A total of twenty (20) samples were taken from the 12 soil borings completed on the embankments of the CCR ponds. The samples were analyzed for moisture content (ASTM D-2216), Atterberg limits (ASTM D-4318), and grain size (ASTM D-422). Laboratory reported results of the soil samples are provided in Attachment C.

On May 19, 2011, Aether surveyed the elevation of each CPT probe location using known benchmarks located throughout the site. The results indicate that the top elevation of each embankment is within ± 1 foot of the same elevation as previous topographic maps show with the exception of CPT7 and CPT 8 which are 3-feet lower than the other CPTs on the Economizer Ash Pile. The ground surface elevations are provided in Attachment A.

<u>CCR and Native Soil Lithology and Properties</u>

The data collected from the CPT and Geoprobe borings confirm that the native dense sand is encountered at elevation 505 to 510 feet consistently across the site except at the very western edge of the site where loess or clay till soils from the adjacent uplands intercede into the floodplain. Throughout the floodplain the soil directly underlying the CCR and overlying the dense sand is medium stiff clay. The imported clay embankment that contains the CCR is medium stiff to stiff clayey silt with some sand. From an interview with a long time staff member at the Generating Station, Aether understands that the clay borrow site was a rock quarry just west of the Station. The surface soil in the Burlington Iowa area is loess with a glacial till found between the loess and limestone bedrock. The observed properties of the clay embankments confirm that loess is the likely source soil.

Where the CPT and geo-probes encountered CCR in the Economizer Ash Pile, the first twenty feet of CCR has properties distinct from the lower ten feet of CCR. The properties of the CCR vary greatly due to cemented layers within the CCR. The cross-section of CPT 4, 5, and 6 encountered a cemented layer at 16 to 20 feet below grade that caused refusal of the CPT probe. Geo-probe boring SB-4 installed coincident with CPT-6 showed that the CCR and native soil lithology was the same as the cross-section at CPT 1, 2, and 3. The cross-section CPT 1, 2, and 3 was used to delineate the embankment. The elevation of saturation in the CCR at the north embankment is elevation 529, which is the same as the water elevation in the Upper Ash Pond. Surface water from the settling pond on top of the Economizer Ash Pile seeps vertically downward beneath the settling pond. A cross-section of the eastern end of the Economizer Ash Pile is shown on Figure 2.

The CPT test results were reviewed to determine the Mohr Coulomb friction angle and cohesion for each layer of CCR or native soil. Figure 3 shows the method used by Aether to interpret the distinct layers of CCR or native soil from the CPT probe results. Figure 3 also shows the method of comparing the geo-probe boring results to the CPT data plot and relating the laboratory test results to stratification shown on the CPT.

The CPT data results indicate that strength parameters for the CCR and native soil may be cohesionless, cohesive or some combination. For purposes of analyzing the strength of the embankments under suddenly applied loads (i.e., seismic), Aether assigned an undrained cohesion only strength to clay and a friction angle only strength to CCR and native sand. The cemented layers in the CCR and the apparent cohesion are ignored and friction angle only is assigned to the CCR, with some minor exceptions.

The CPT data results for clay layers are assigned an undrained shear strength (cohesion) based on the procedure recommended by Robertson[1]. The undrained shear strength is:

$$S_u = (q_c - \alpha_0) / N_k$$

Where: S_u = undrained shear strength
q_c = cone penetration pressure
α_0 = total vertical overburden stress
N_k = a constant varying from 11 to 19 (15 recommended for normally consolidated clay)

The friction angle for cohesionless soil is related to the cone penetration value empirically as a variation on effective confining stress. The method is shown in Robertson and on Figure 19.5 of Terzaghi[2]. The figure from Terzaghi is included in Attachment A.

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[1] Robertson, P.K. and Campanella, R.G., 1986, "Guidelines for Use, Interpretation and Application of the CPT and CPTU, "UBC, Soil Mechanics Series No. 105, Civil Engineering Department, Vancouver BC, V6T 1W5

The results indicate the native clay cohesion ranges from 600 to 1200 pounds per square foot (psf). The measured cohesion of the native clay is higher than used for the February 3, 2011 analysis. For the CCR, friction angle ranges from 30 to 34 degrees without factoring in cemented layers. For pseudo-static stability analysis, when liquefaction occurs, the saturated ash at the bottom of the CCR (immediately above the native clay) is assigned a friction angle of 25 degrees (silt with relative density of 0%), NAVFAC[3].

Embankment Stability – Static At Normal Operating Conditions

Economizer Ash Pile – The Economizer Ash Pile was constructed on top of a portion of the original Upper Ash Pond. The south embankment and the east embankment of the Pile are constructed of imported clay over the clay embankments of the original Upper Ash Pond (CPT 9, 10, 11, and 12 and SB-3). The north and west embankment of the Pile are constructed over CCR that was deposited into the Upper Ash Pond prior to construction of the Pile and are the least stable embankments of the Economizer Ash Pile. The thickness of the CCR from the Upper Ash Pond is greatest on the East end and becomes thinner to the West (CPT 1 through 8 and SB 1, 2 and 4).

The results of the May 2011 investigation show that the eastern 500-feet of the northern embankment of the Economizer Ash Pile is constructed of CCR. The western part of the north embankment is imported clay compacted on top of CCR. Both cross-sections were evaluated for static stability of the Economizer Ash Pile. The strength parameters from the CPT results are:

Soil Type	Depth Range (ft)	Cohesion (PSF)	Friction Angle (deg)
Eastern Cross-Section			
CCR cohesionless	0-20	0	34
CCR cohesionless	20-33		32
CCR cohesive (two small layers)	20-33	1000	0
Native Clay	33-41	600	0
Native Dense Sand	>41	0	30
Western Cross-Section			
Embankment Clay	0-15	1200	0
CCR	15-25	0	32
Native Clay	25-35	700	0
Native Dense Sand	>40	0	30

[2] Terzaghi, Karl, Ralph Peck and Gholamreza Mesri, "Soil Mechanics in Engineering Practice", Third Edition, John Wiley and Sons, 1996.
[3] Naval Facilities Command, Design Manual – Soil Mechanics, Foundations, and Earth Structures, March 1971, Figure 3-7.

The embankment geometry and soil layers and strengths were used as input to the two dimensional limit-equilibrium slope stability analyses program STABL5M (1996)[4] to analyze hundreds of potential slip surfaces for each case. The program calculates a factor of safety based on the ratio of the driving forces to the resisting forces along each potential slip surface. A calculated factor of safety greater than one indicates stability along the surface analyzed. Both circular surfaces and block slides were investigated with the block slide showing slightly lower factor of safety and with the native clay layer under the CCR controlling the stability.

The minimum static factor of safety for the eastern cross-section is 1.5 and for the western cross-section 1.7. The output results for the static analysis of multiple searches are presented in Attachment D.

Ash Seal, Main Ash and Upper Ash Ponds – The soil strength parameters from the CPT results for the stability of the other three CCR Ponds are:

Ash Pond	Strata	Cohesion PSF	Friction Angle Degrees
Ash Seal	Embankment	700	
	Sand		37
	Clay	900	
Main	Embankment	700	
	Clay	1200	
Upper	Embankment	1950	
	Clay	900	
	Sand		35

The CPT results and laboratory confirmation show the native clay layer is present under all of the ponds with the exception of the eastern Ash Seal pond where coarser grained levee deposit are under the imported clay embankment. The static stability of each pond was reassessed with the measured strength parameters. The results of the analysis indicate that revised static stability factors are greater than 1.5. The results are presented in Attachment D.

Ash Pond	Minimum Factor of Safety
Ash Seal	2.2
Main	4.3
Upper	3.4
Economizer	1.5

4 STABL User Manual, By Ronald A. Siegel, Purdue University, June 4, 1975 and STABL5 …The SPENCER Method of Slices: Final Report, By J.R. Carpenter, Purdue University, August 28, 1985

Embankment Stability – Earthquake with Normal Operating Conditions

An earthquake induced loading on the embankments may cause excessive displacement of the embankment resulting in a release of the contents or could result in liquefaction of the CCR in the embankment for the Economizer Ash Pile. The native soils below the embankments are predominantly clay with a plastic index greater than 12 and will not liquefy during an earthquake, Moss[5]. The only liquefiable soil found during the CPT investigation is the saturated ash above the native clay and below the water table at elevation 529 feet under the north embankment of the Economizer Ash Pile.

To determine if the saturated CCRs will liquefy, an analysis of the cyclic stress ratio (CSR) from the design earthquake was completed for the Economizer Ash Pile and was compared to the cyclic resistance ratio (CRR) determined from the CPT data. The CPT data was converted to a CRR using the procedure proposed by Moss. The procedure incorporates data from known worldwide liquefaction results into the recommended procedures of the National Council for Earthquake Engineering and Research for establishing CRR from CPT results. The CRR results for the Economizer Ash Pile are shown in Attachment E. The CRR that will cause liquefaction in the saturated zone just above the native clay is 0.08. (CRR is the ratio of the shear stress to the effective confining stress).

The CCR ponds and piles are low hazard embankments as determined by the EPA. A low hazard dam (embankment) will not result in loss of life if the dam fails. FEMA[6] indicates that a safety evaluation earthquake (maximum design earthquake) should be selected based on the hazard rating of the dam. The International Building code uses a probability of 2% in 50 years (return period of 2475 years) for design of structures that are moderate to high risk for loss of life. For low risk structures, a probability of 10% in 50 years (return period of 475 years) is an acceptable standard. For analysis of the impacts on the liquefaction and the pseudo-static safety factors, Aether used the 475 year return period for the analysis.

Economizer Ash Pile – The CSR and maximum earthquake acceleration were determined by analyzing the soil profile at the Economizer Ash Pile using the program SHAKE[7]. SHAKE performs a one-dimensional analysis of the earthquake motion traveling upward from rock/very dense gravel at 80-feet below ground surface and produces an amplified and filtered earthquake response at other depths. SHAKE also determines the peak acceleration in each layer and the ratio of the maximum shear stress to confining pressure at strains that are 65% of the maximum shear strain determined in the analysis. The input earthquake record was scaled to an effective peak horizontal acceleration of 2.5% of gravity at bedrock. The scale factor was determined using the United States Army Corps of Engineers program DEQRAS which provides the probabilistic effective scale factor based on the

[5] Moss R.E.S., R. B. Seed, R. E. Kayen, J.P. Stewart and K. Tokimatsu, "Probabilistic Liquefaction Triggering based on Cone Penetrometer Test", Geo-Frontiers 2005.
[6] Federal Emergency Management Agency, "Federal Guidelines for Dam Safety", May 2005
[7] SHAKE 2000, A Computer Program for the 1-D Analysis of Geotechnical Earthquake Engineering Problems, November 2007

latitude and longitude of the site. For Burlington Station the 475 year return scalar is 2.5% of gravity.

The result of the SHAKE analysis is shown in Attachment E. The CSR in the saturated CCR is 0.105 which is greater than the CRR of 0.08 and liquefaction is probable during the seismic design event. Liquefaction will result in the saturated layer losing strength and the loss of strength along with the forces of ground motion could cause the slope of the north Economizer Ash Pile to slide into the Upper Ash Pond.

To evaluate the potential of movement, the Economizer Ash Pile embankment was analyzed for pseudo-static forces from the earthquake. The analyses from the SHAKE run indicate that the horizontal earthquake force in the embankment above the liquefied CCR averages 7.5% of gravity. This force along with a vertical force $^2/_3$ of the horizontal force (5.0% of gravity) was applied to the embankment and a block slide was analyzed going through the liquefied layer. The liquefied layer was assigned a reduced friction angle of 25°, the minimum friction angle for silt with a relative density of 0% (NAVFAC).

The result of the pseudo-static analysis is a safety factor of 1.0 with the surface going through the native clay and not the liquefied CCR which has a higher safety factor. The results of the analysis are presented in Attachment F. For the western cross-section of the Economizer Ash Pile, the failure also goes through the native clay with a minimum factor of safety of 1.1. Both safety factors indicate acceptable earthquake response in accordance with FEMA Guidelines for Dam Safety. Only the western cross-section meets the minimum safety factor of 1.1 established as EPA policy.

Ash Seal, Main Ash and Upper Ash Ponds – The remainder of the ponds are constructed of imported clay over native clay or at the east of the Ash Seal Pond dense levee deposits under the embankment. There is no risk of the native soil liquefying with resultant stability issues for the embankment. However, the embankments will be subject to extra loading during a seismic event. The results of the analysis using a horizontal acceleration of 6.8% of gravity and a vertical acceleration of 4.5% of gravity are:

Ash Pond	Minimum Factor of Safety
Ash Seal	1.8
Main	2.6
Upper	2.6

Conclusion

Static Embankment Stability – The Economizer Ash Pile has a minimum static safety factor of 1.5. The increase from 1.1 reported in February 3, 2011 is due to using stronger native clay and stronger ash embankment strengths based on the CPT data and the lowering of the ground water table to represent measured conditions. Based on the CPT data results, the Ash Seal, Main and Upper Ash Ponds have minimum static factors of safety from 2.2 to 4.3 based on higher strengths of the embankment clay and native clay layers as measured in the CPT data.

<u>Pseudo-Static Earthquake Stability</u> – For a design basis earthquake at the Economizer Ash Pile the embankment may deform or liquefy and the contents of the pond may slide into the Upper Ash Pond. Since the slide would likely occur in the native clay layer below the CCR the movement would be slow and contained within the Upper Ash Pond keeping the impact within the existing CCR management units. The minimum factor of safety for the Economizer Ash Pile under pseudo-static earthquake is 1.0. Based on soil strengths from the CPT results, the Ash Seal, Main and Upper Ash Ponds have minimum pseudo-static factors of safety of 1.8 to 2.6.

We appreciate the opportunity to perform an assessment of the Burlington Generating Station Ash ponds.

If you have any questions, please call.

STUART H. RUSSELL REGISTERED 8752 IOWA PROFESSIONAL ENGINEER

Stuart Russell, Iowa P.E. # 8752

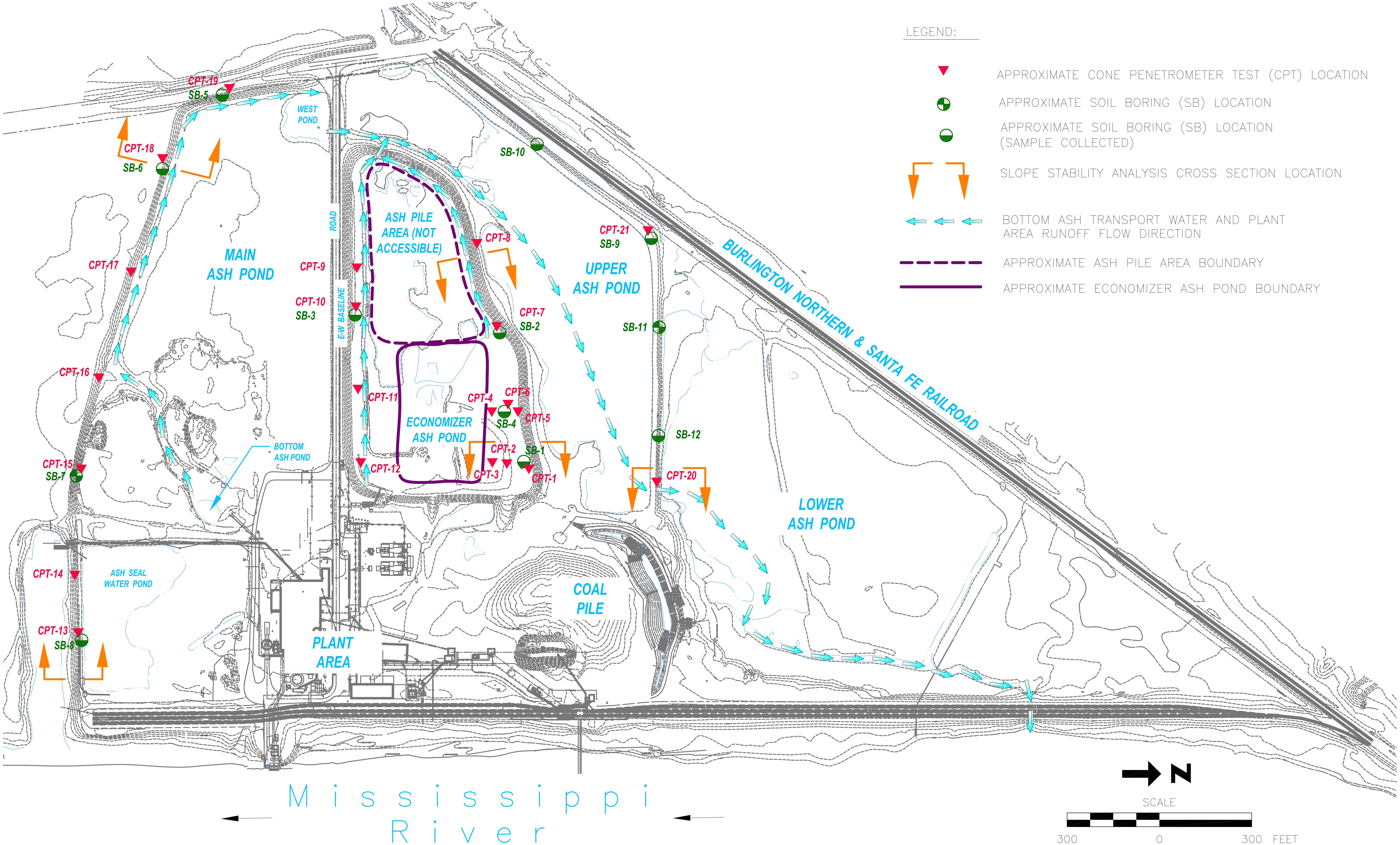
Timothy J. Harrington, P.E.

Figures:

- Figure 1- CPT and SB Locations
- Figure 2 – Economizer Ash Pond Cross Section
- Figure 3 – CPT and SB Correlation

Attachments:

- Attachment A – Cone Penetrometer Test Results
- Attachment B – Boring/Geoprobe Logs
- Attachment C – Soil Laboratory Results
- Attachment D – Static Slope Stability Analyses
- Attachment E – Cyclic Resistance Ratio and Cyclic Stress Ratio
- Attachment F – Dynamic/Pseudo-Static Slope Stability Analyses



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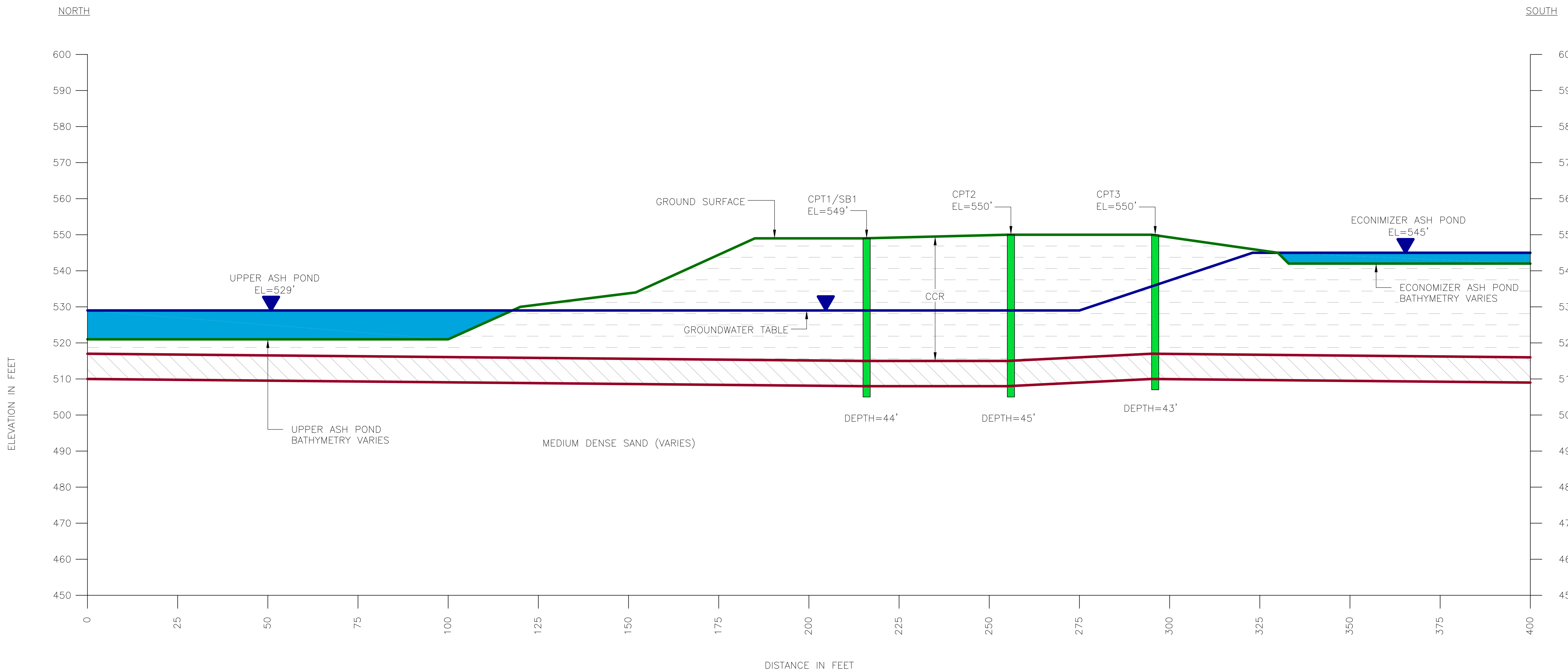
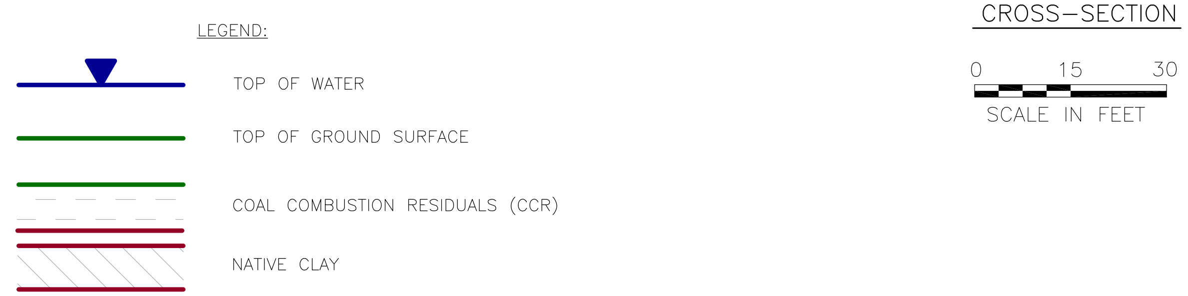


CROSS–SECTION



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ALLIANT ENERGY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

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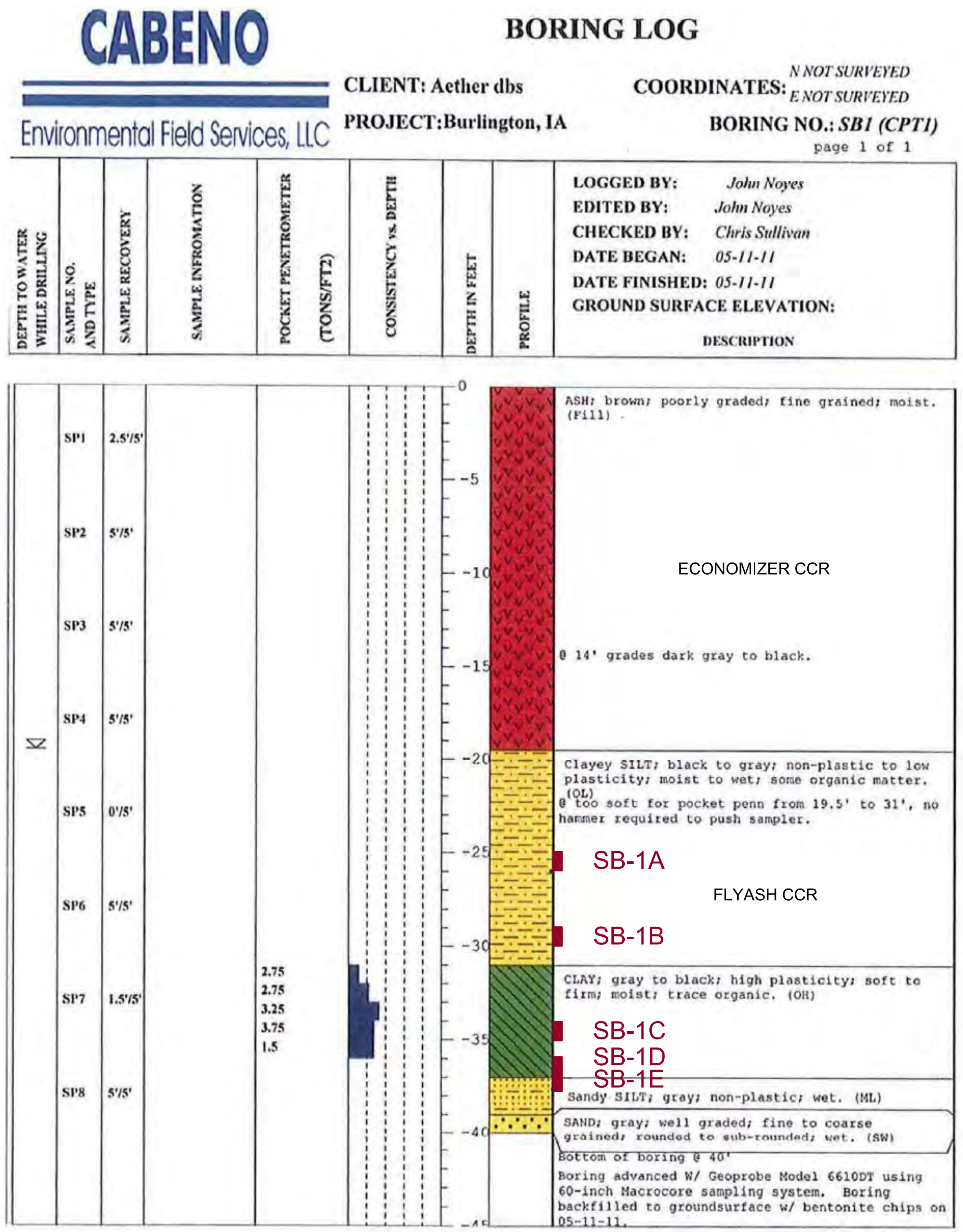

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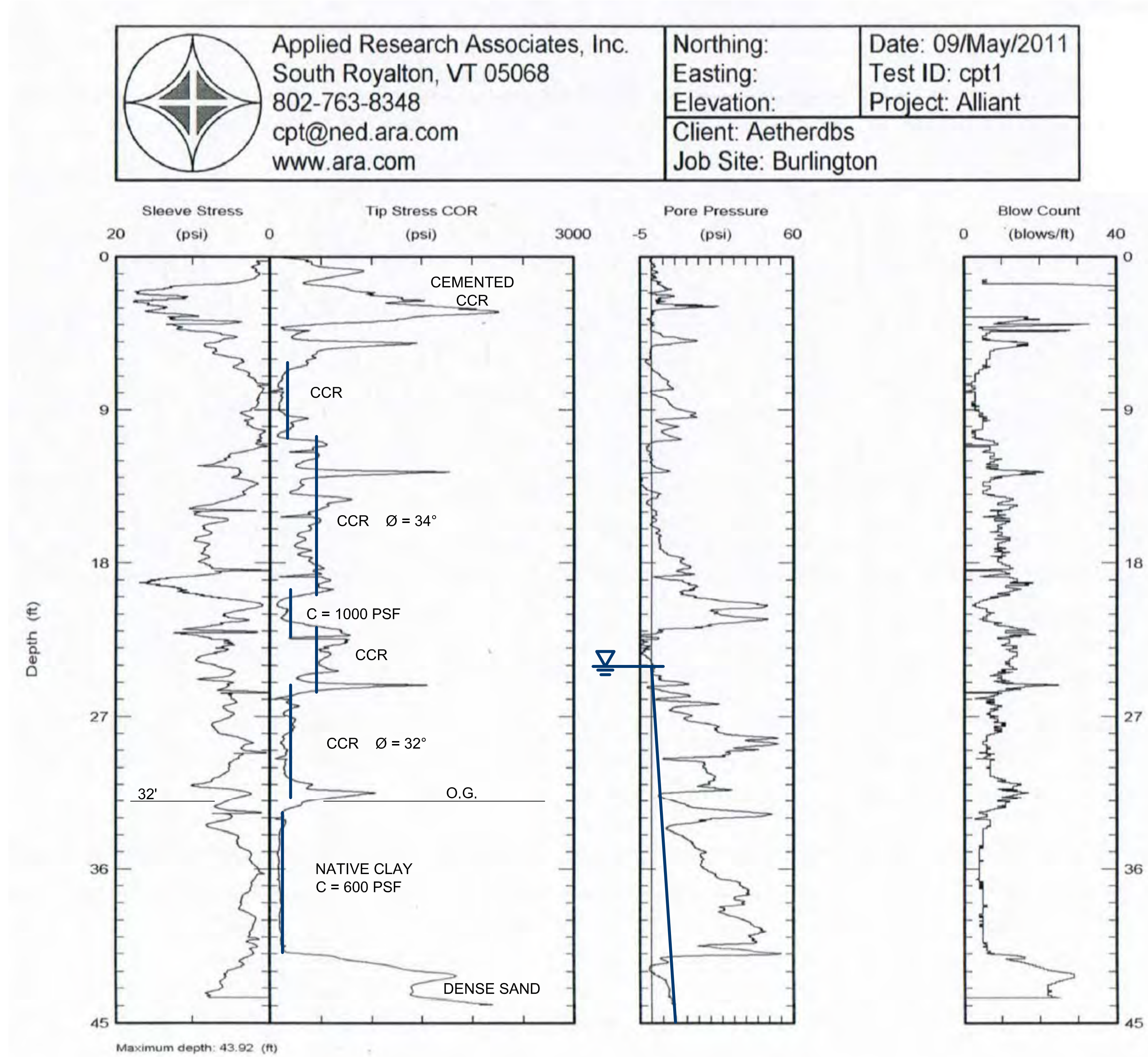

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DRAWING DESCRIPTION
CPT AND SB CORRELATION

JOB 154.002.009.002
SHT. 3
DWG. FIGURE 3

Attachment A

Cone Penetrometer Test (CPT) Results

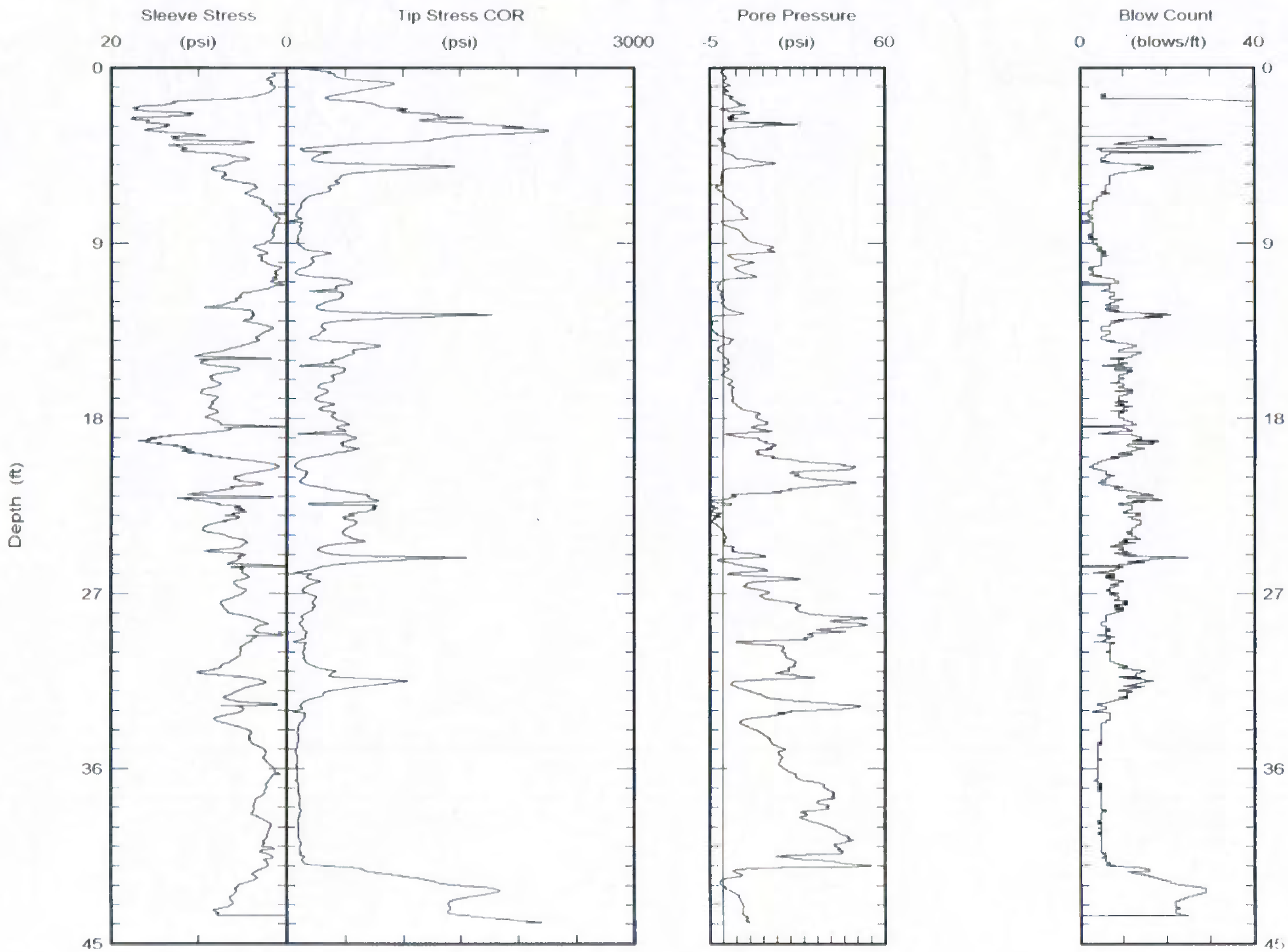
Burlington Generating Station

Source:
CABENO Environmental Field Services, LCC May 2011

CONE PENETROMETER TEST (CPT)

CPT I.D.	LOCATION	GROUND ELEVATION (FT)
CPT-1	Economizer Ash Pond	548.78
CPT-2	Economizer Ash Pond	550.34
CPT-3	Economizer Ash Pond	549.91
CPT-4	Economizer Ash Pond	549.65
CPT-5	Economizer Ash Pond	549.74
CPT-6	Economizer Ash Pond	550.57
CPT-7	Economizer Ash Pond	545.78
CPT-8	Economizer Ash Pond	546.26
CPT-9	Economizer Ash Pond	549.48
CPT-10	Economizer Ash Pond	549.42
CPT-11	Economizer Ash Pond	547.86
CPT-12	Economizer Ash Pond	548.25
CPT-13	Ash Seal Water Pond	534.22
CPT-14	Ash Seal Water Pond	533.67
CPT-15	Main Ash Pond	536.75
CPT-16	Main Ash Pond	534.84
CPT-17	Main Ash Pond	534.52
CPT-18	Main Ash Pond	533.89
CPT-19	Main Ash Pond	535.32
CPT-20	Upper Ash Pond	530.47
CPT-21	Upper Ash Pond	530.42

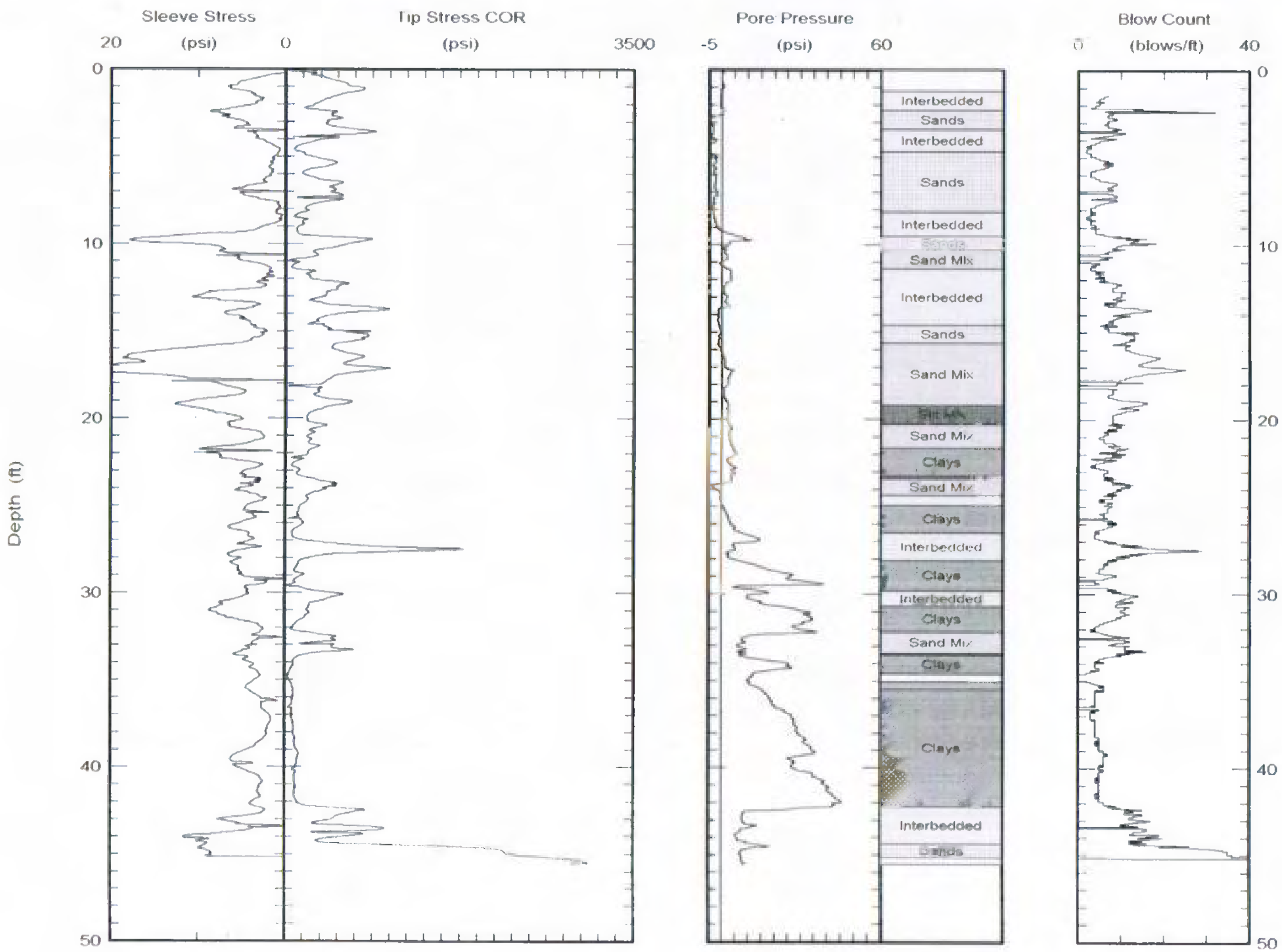
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 09/May/2011 Test ID: cpt1 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 43.92 (ft)

Test ID: cpt1
File: A09Y1101C.ECP

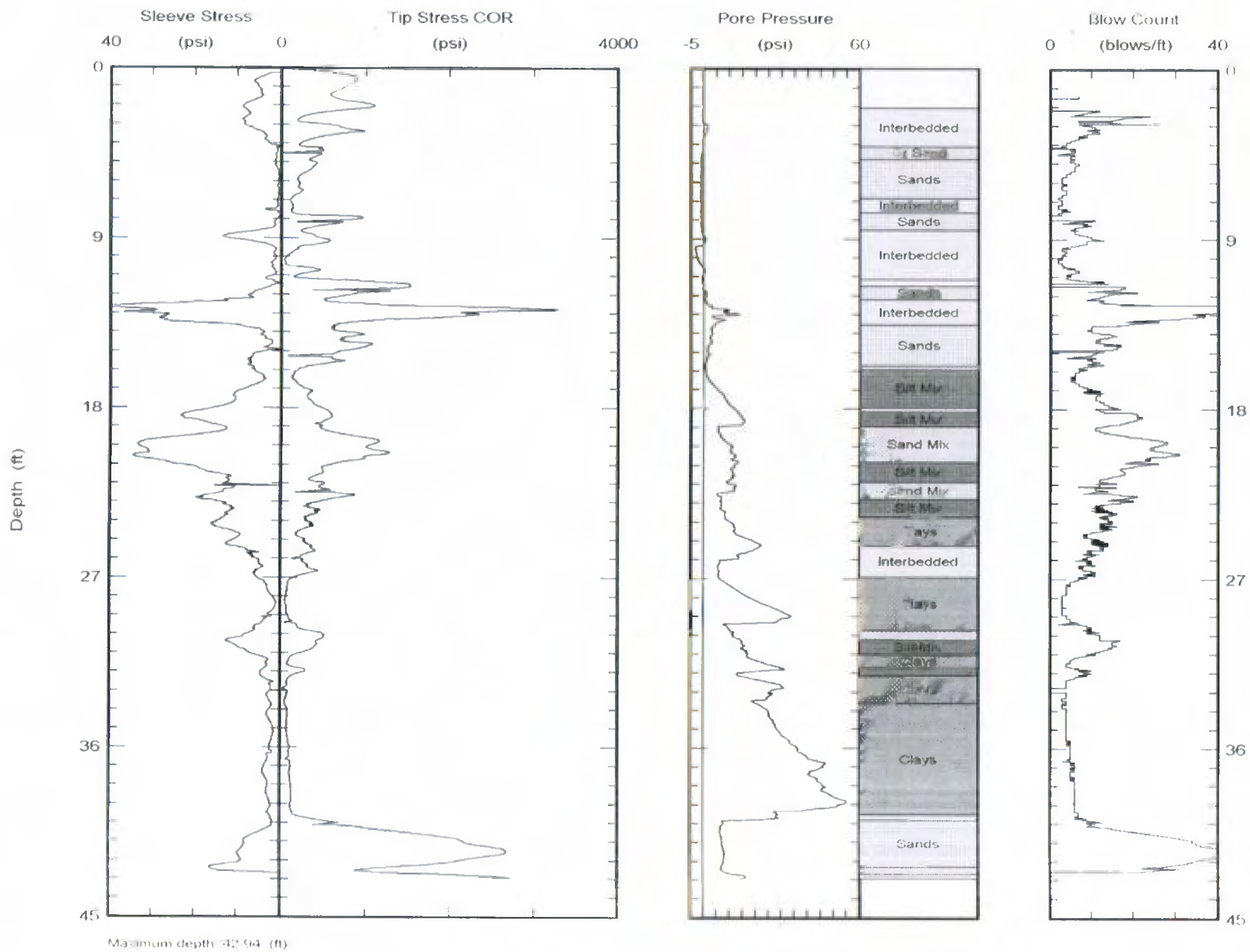
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 09/May/2011 Test ID: cpt2 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



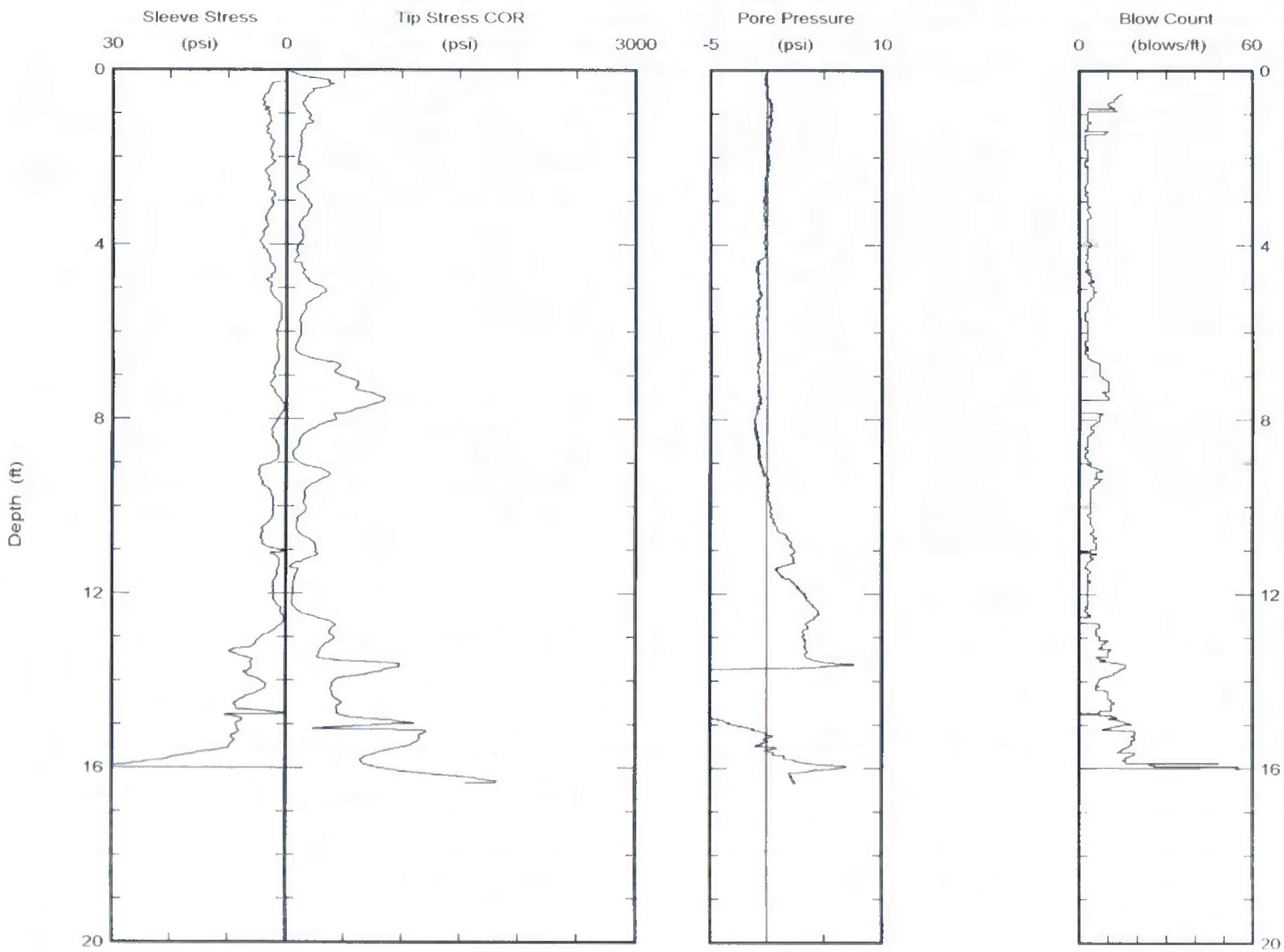
Maximum depth: 45.54 (ft)

Test ID: cpt2
File: A05Y1102C.ECP

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 09/May/2011 Test ID: cpt3 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

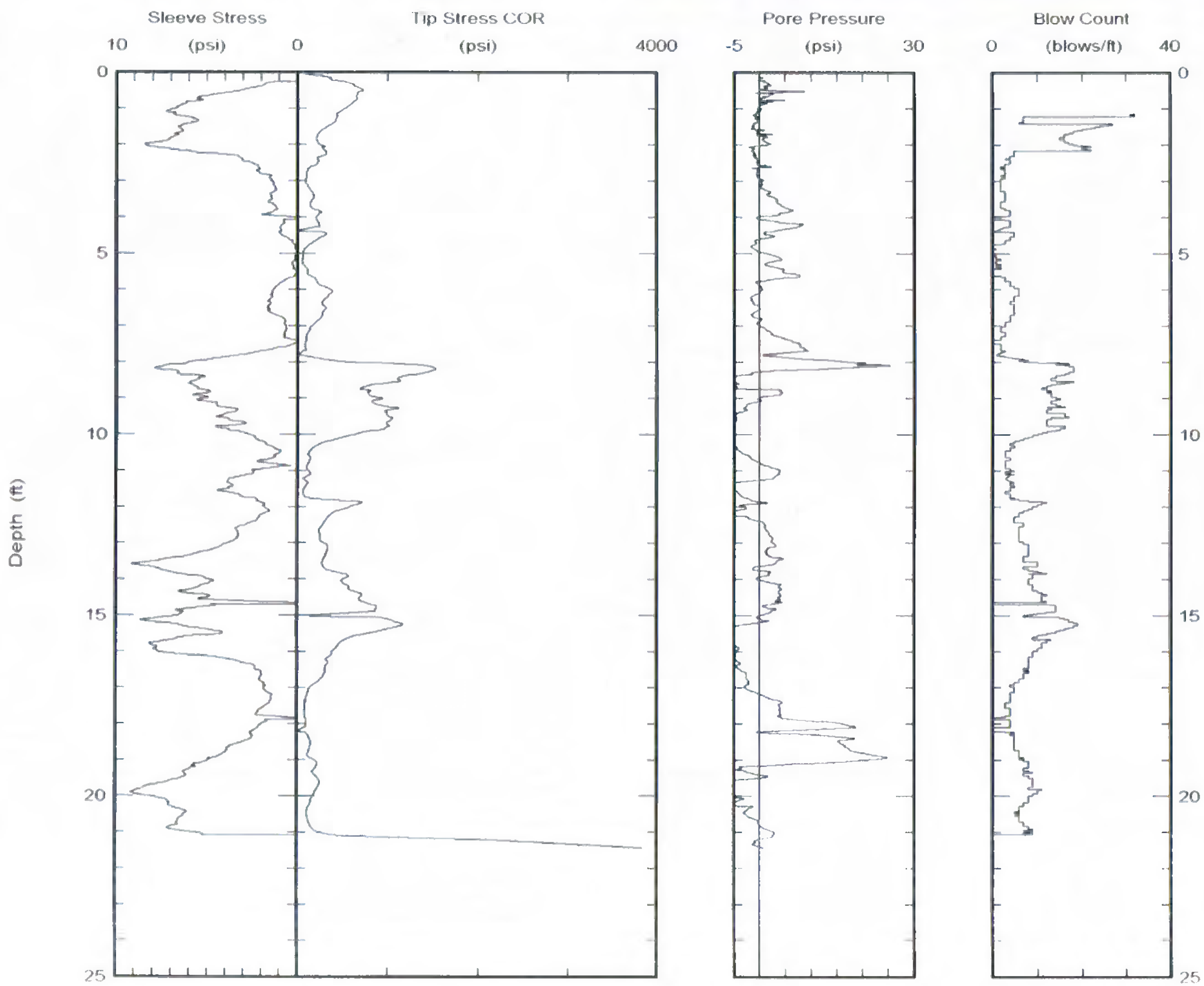


Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 09/May/2011 Test ID: cpt4 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



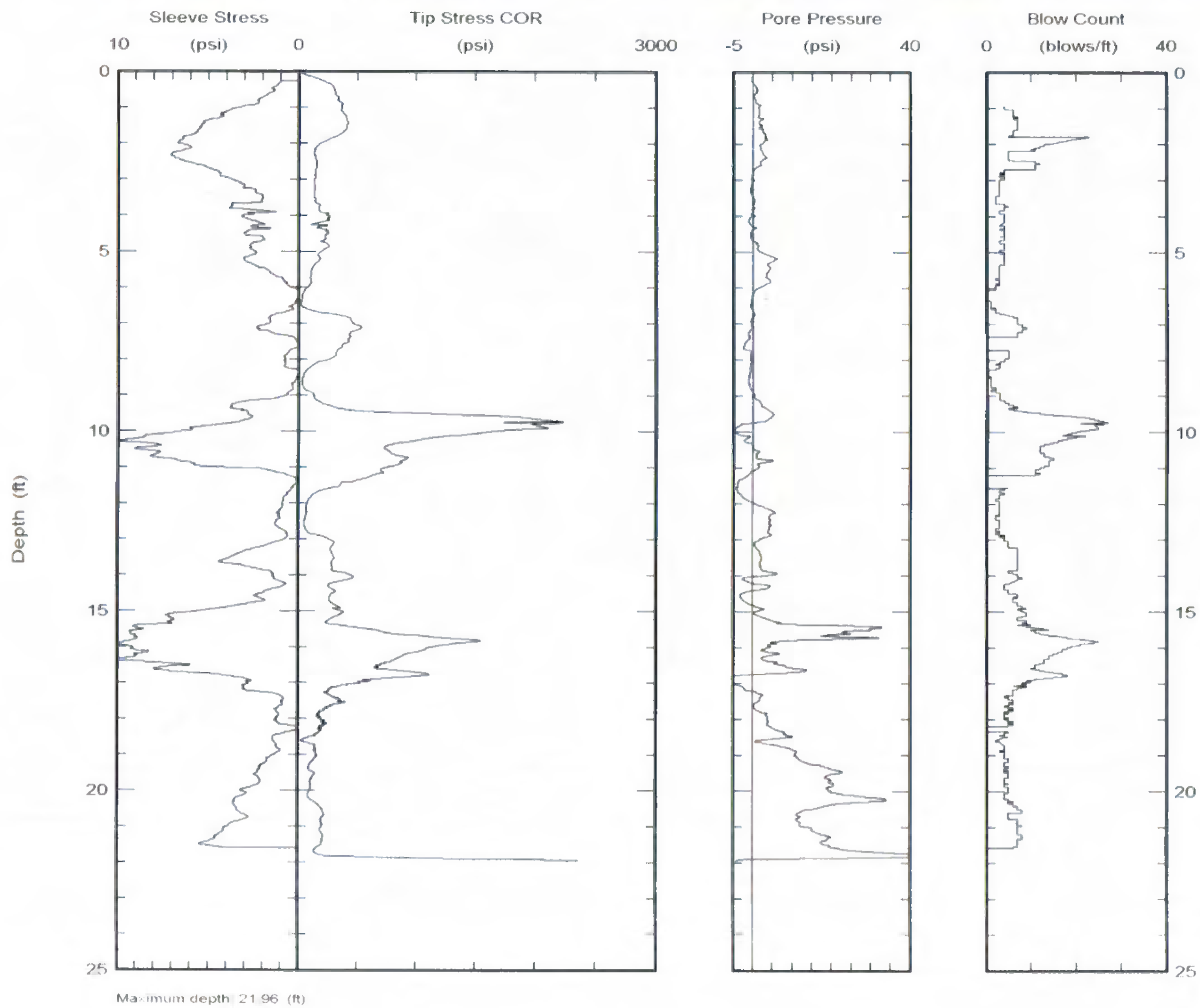
Maximum depth: 16.35 (ft)

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt5 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



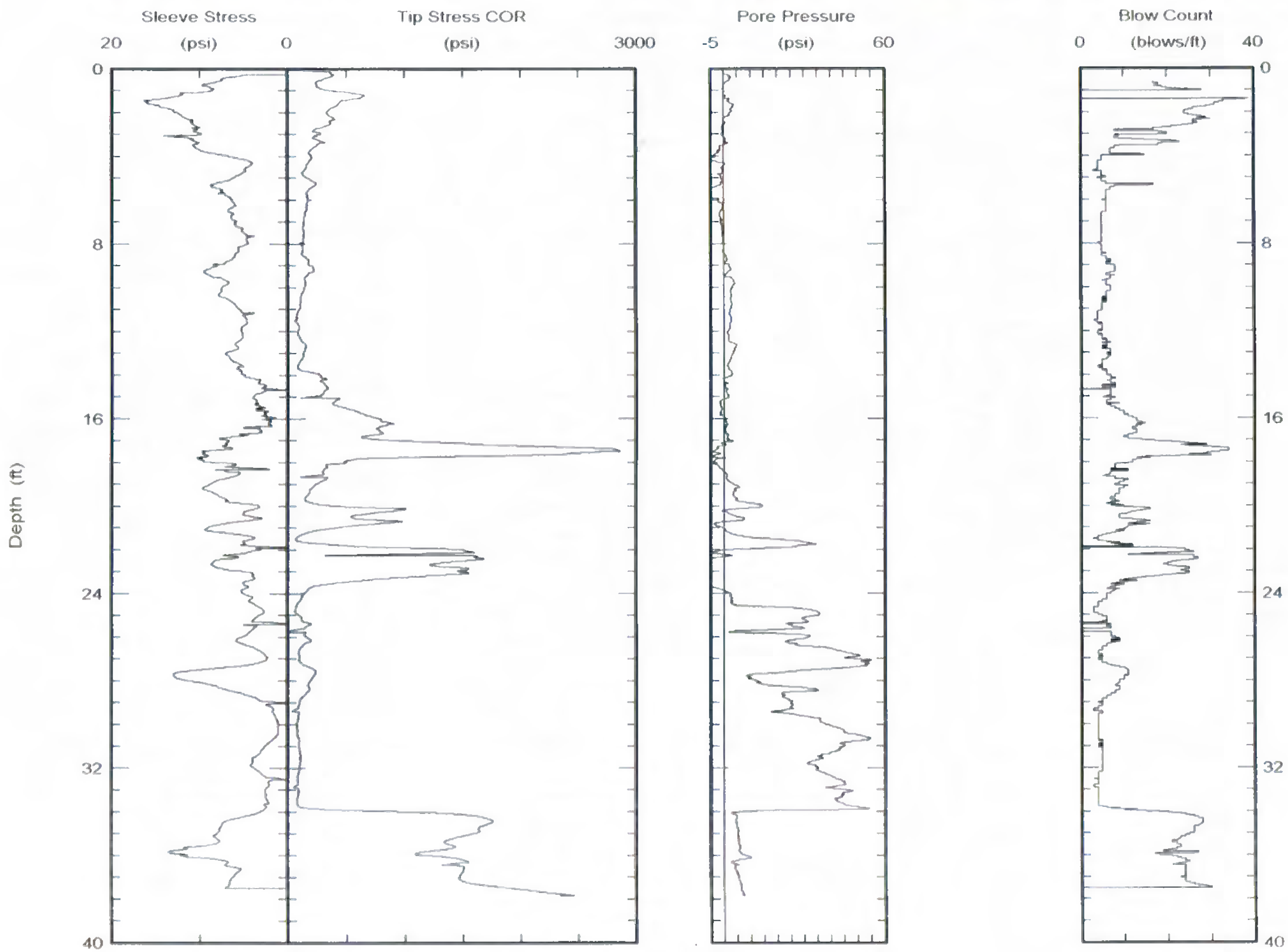
Maximum depth: 21.43 (ft)

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt6 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Test ID: cpt6
File: A10Y1102C.ECP

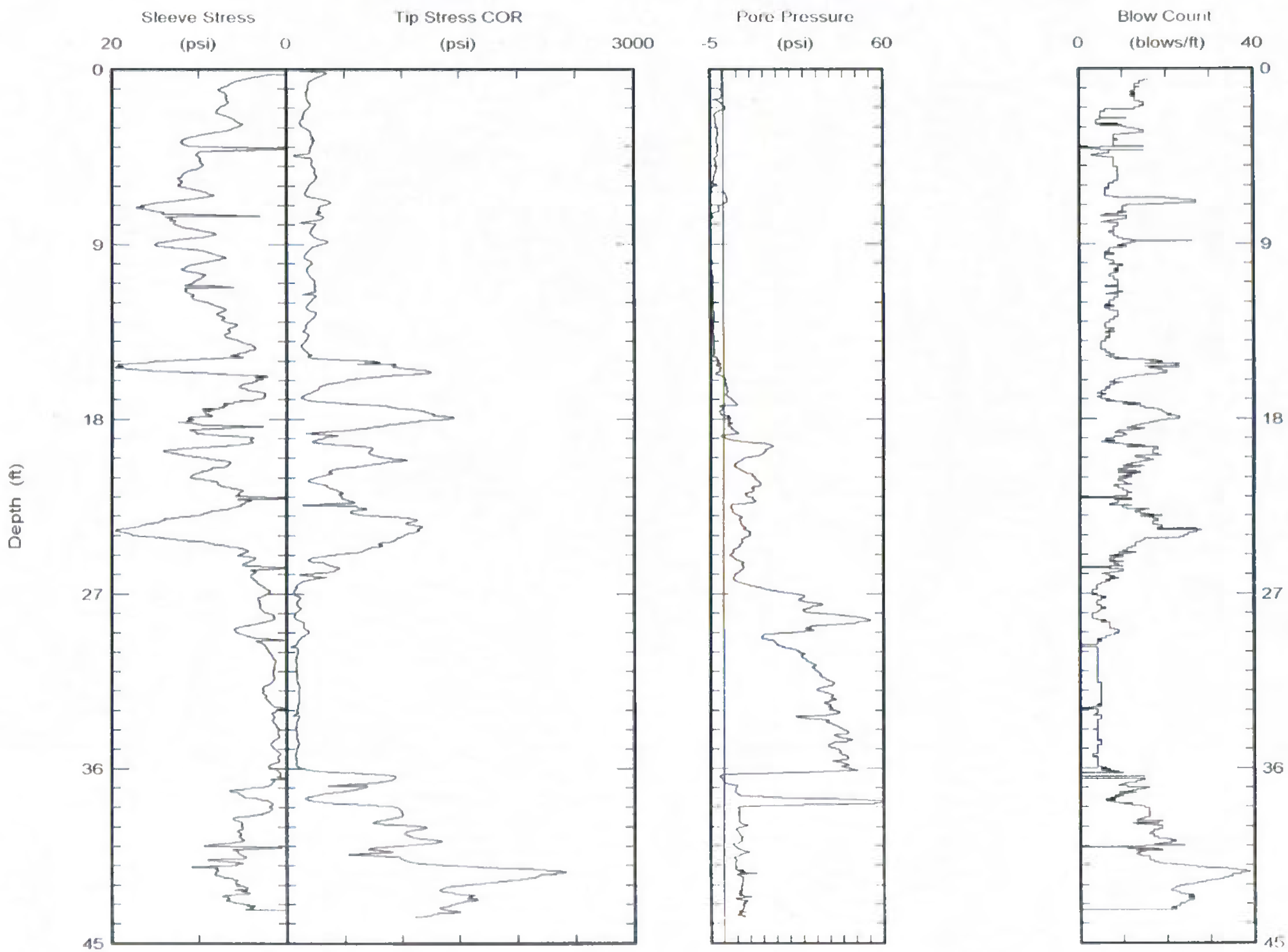
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt7 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 37.86 (ft)

Test ID: cpt7
File: A10Y1103C.ECP

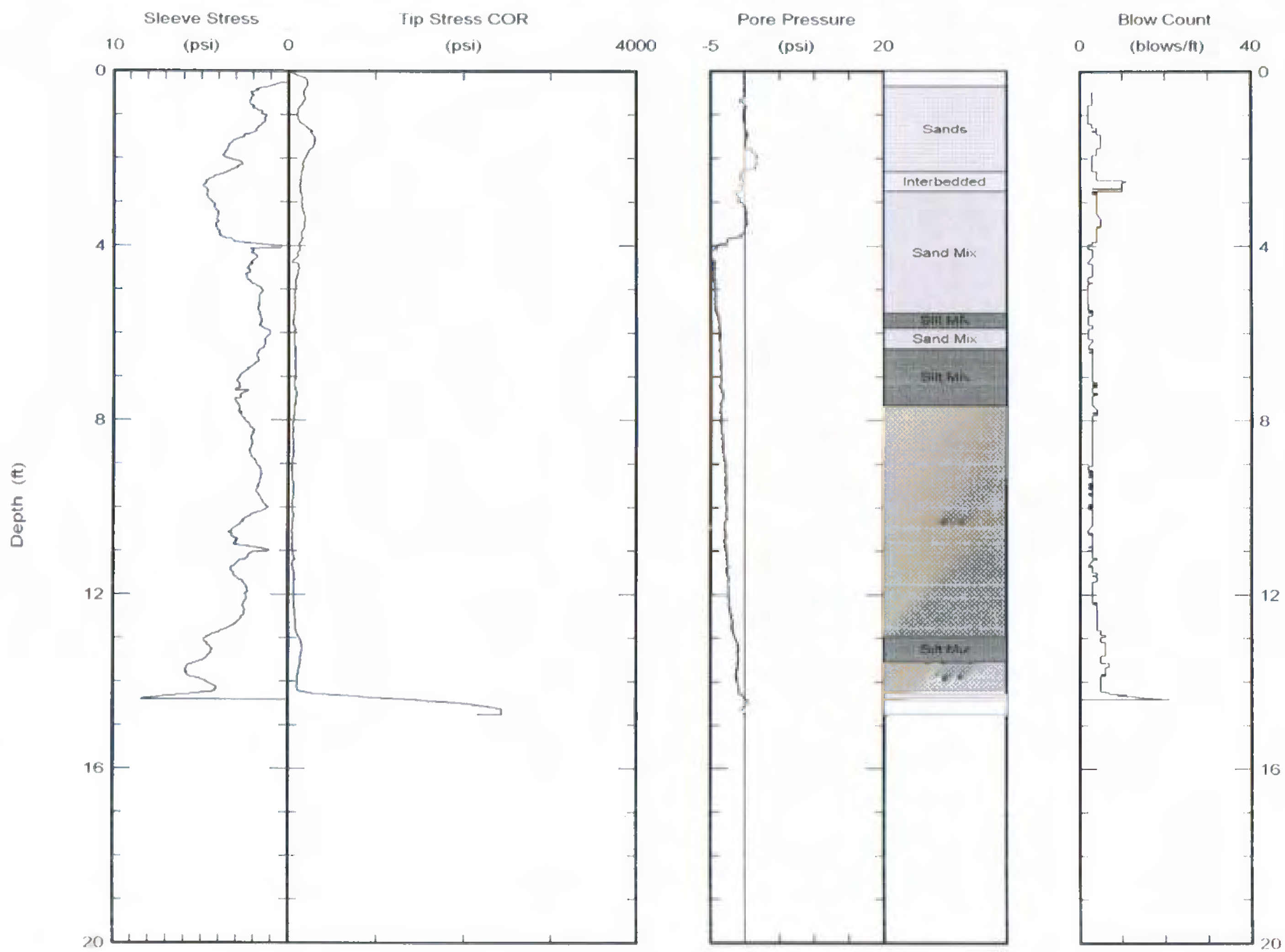
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt8 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 43.65 (ft)

Test ID: cpt8
File: A10Y1104C.ECP

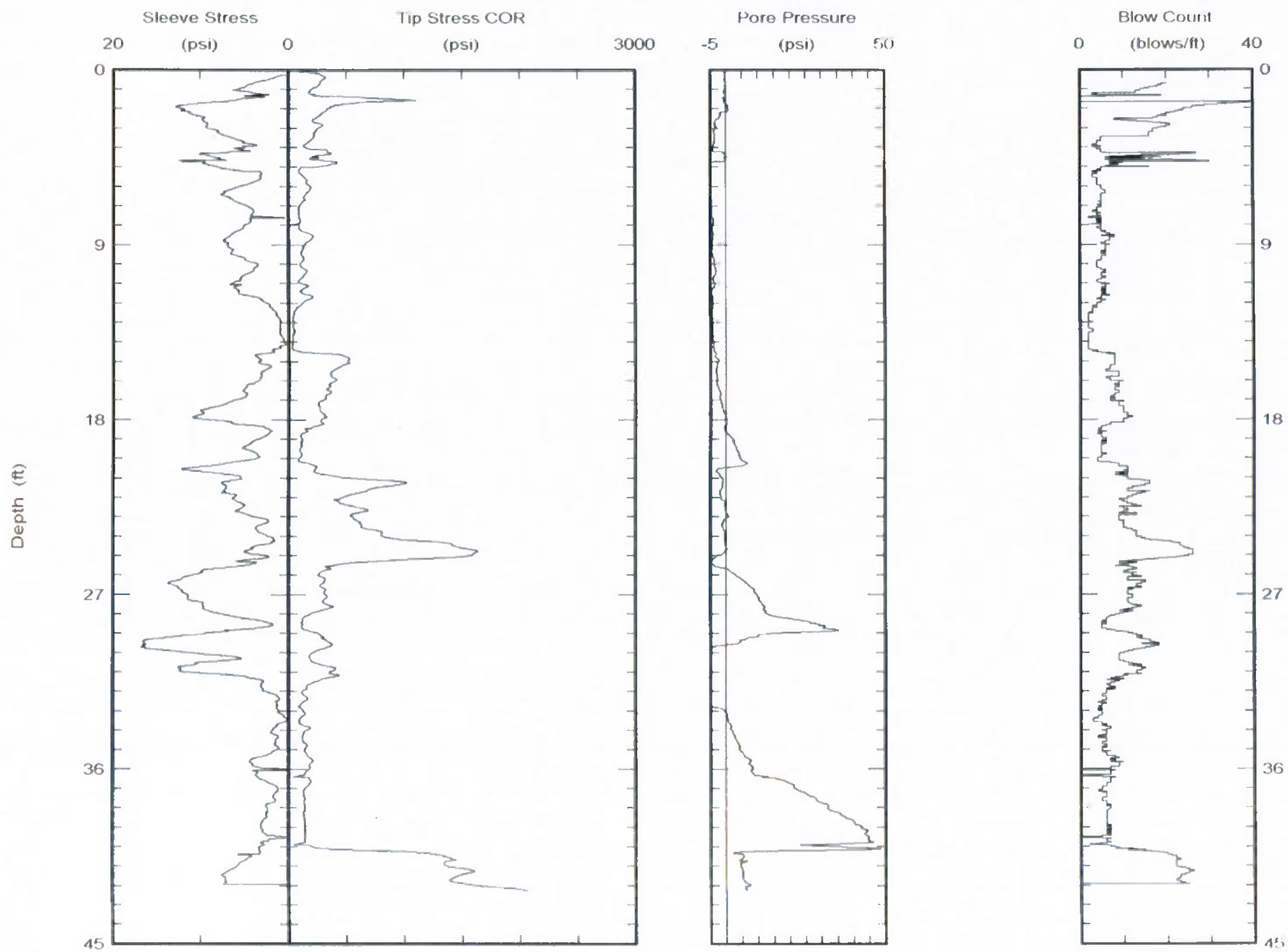
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt9 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 14.76 (ft)

Test ID: cpt9
File: A10Y1105C.ECP

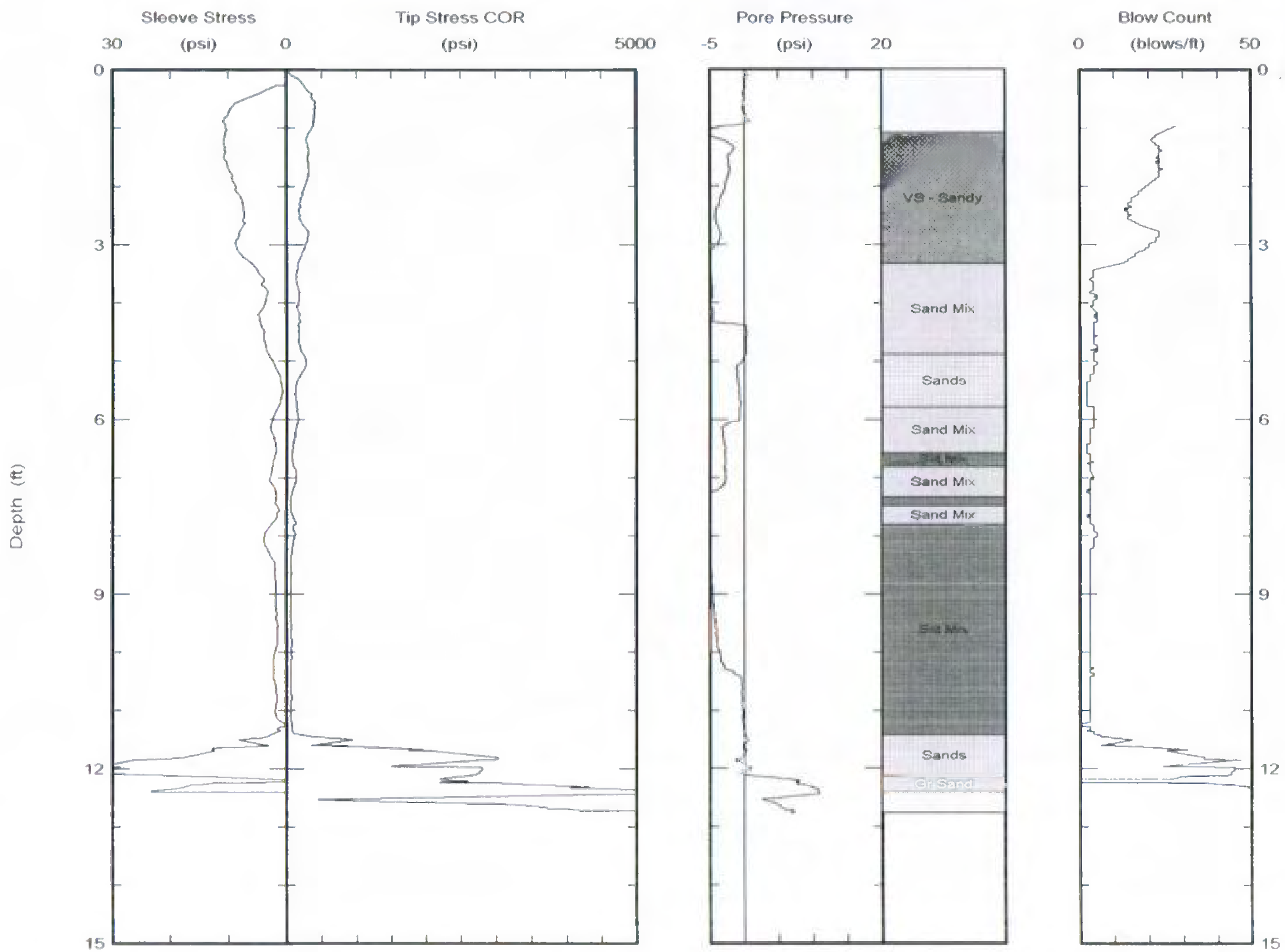
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt10 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 42.27 (ft)

Test ID: cpt10
File: A10Y1106C.ECP

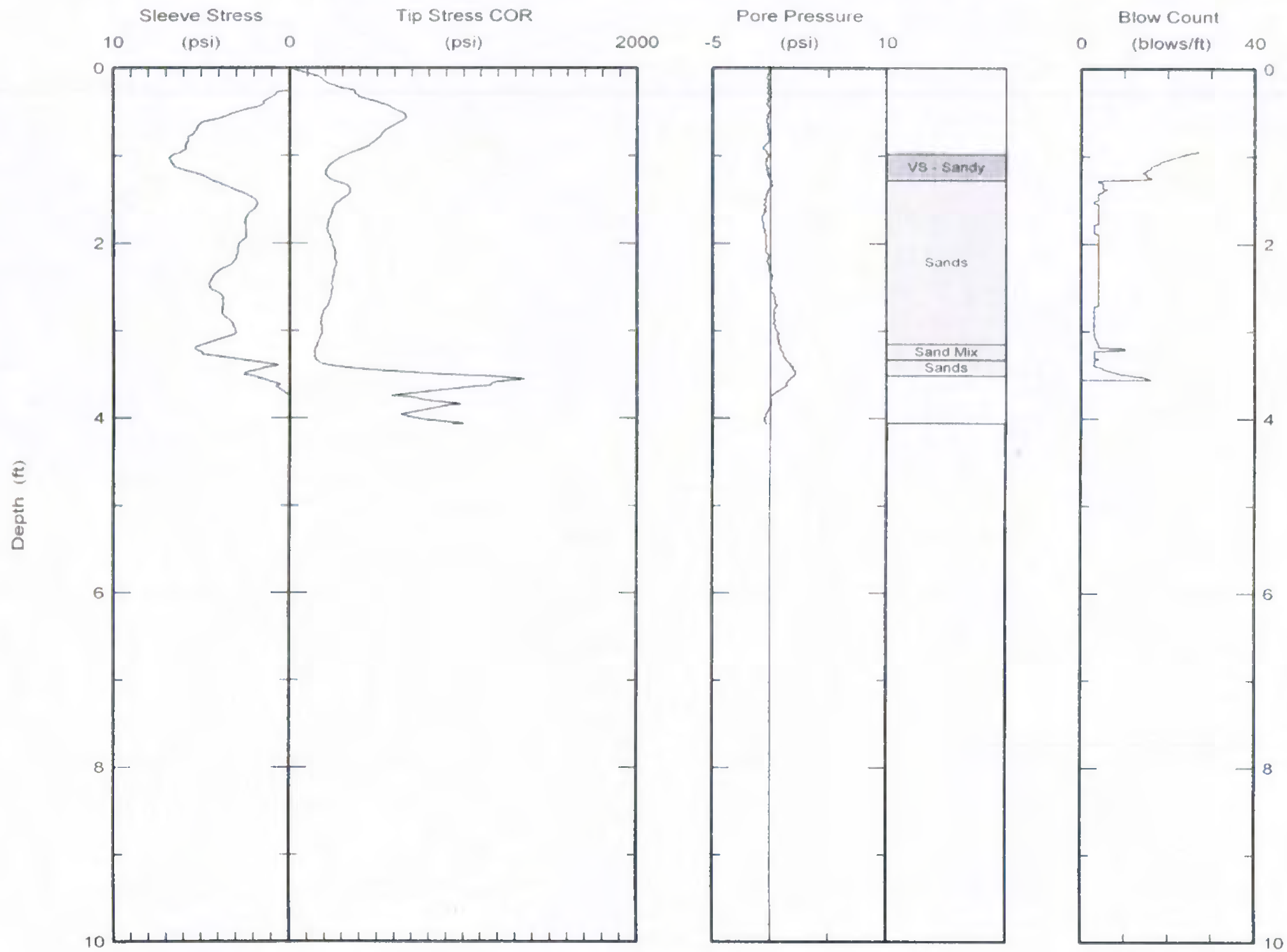
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt11 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 12.76 (ft)

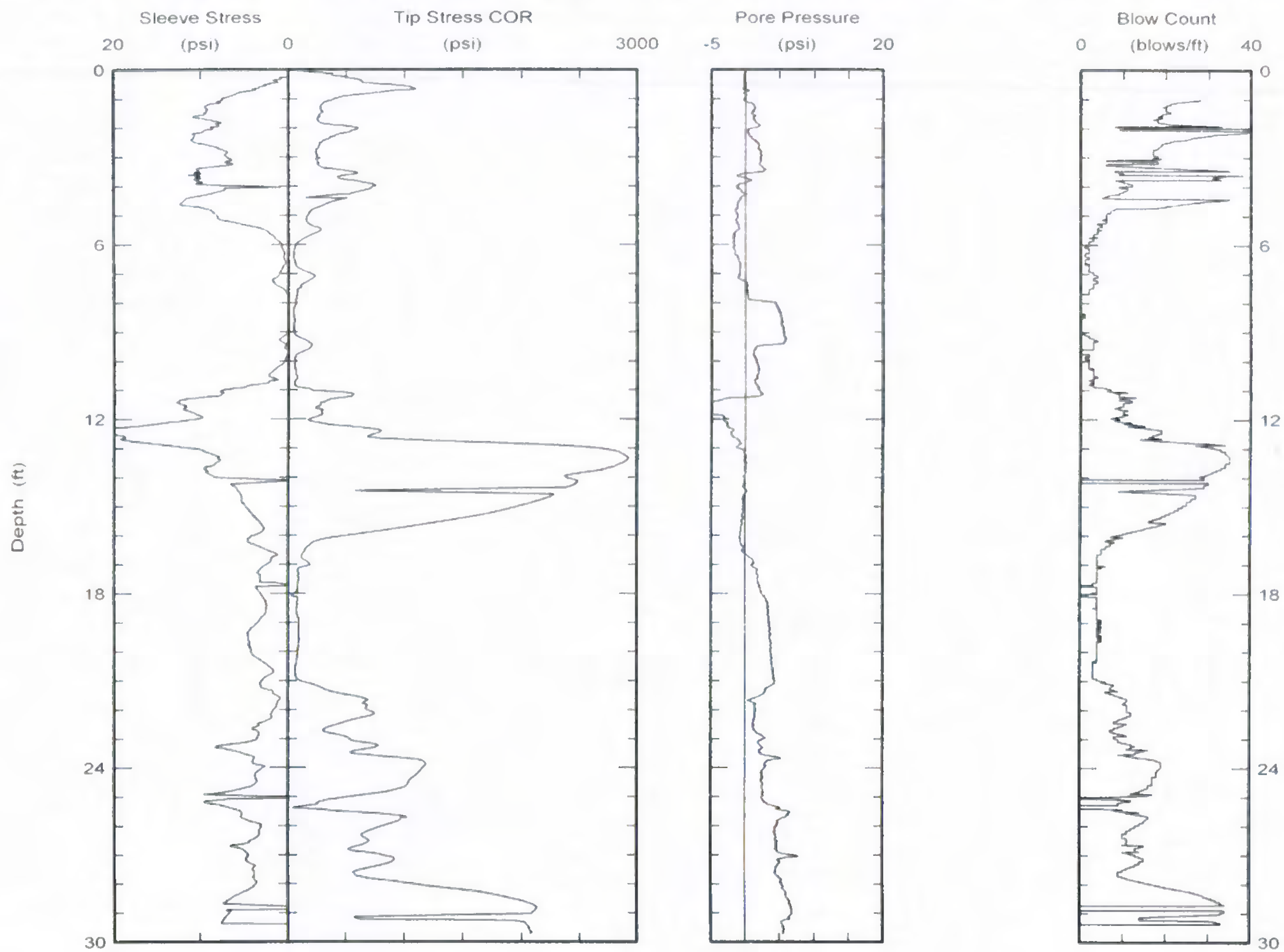
Test ID cpt11
File A10Y1107C ECP

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt12 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



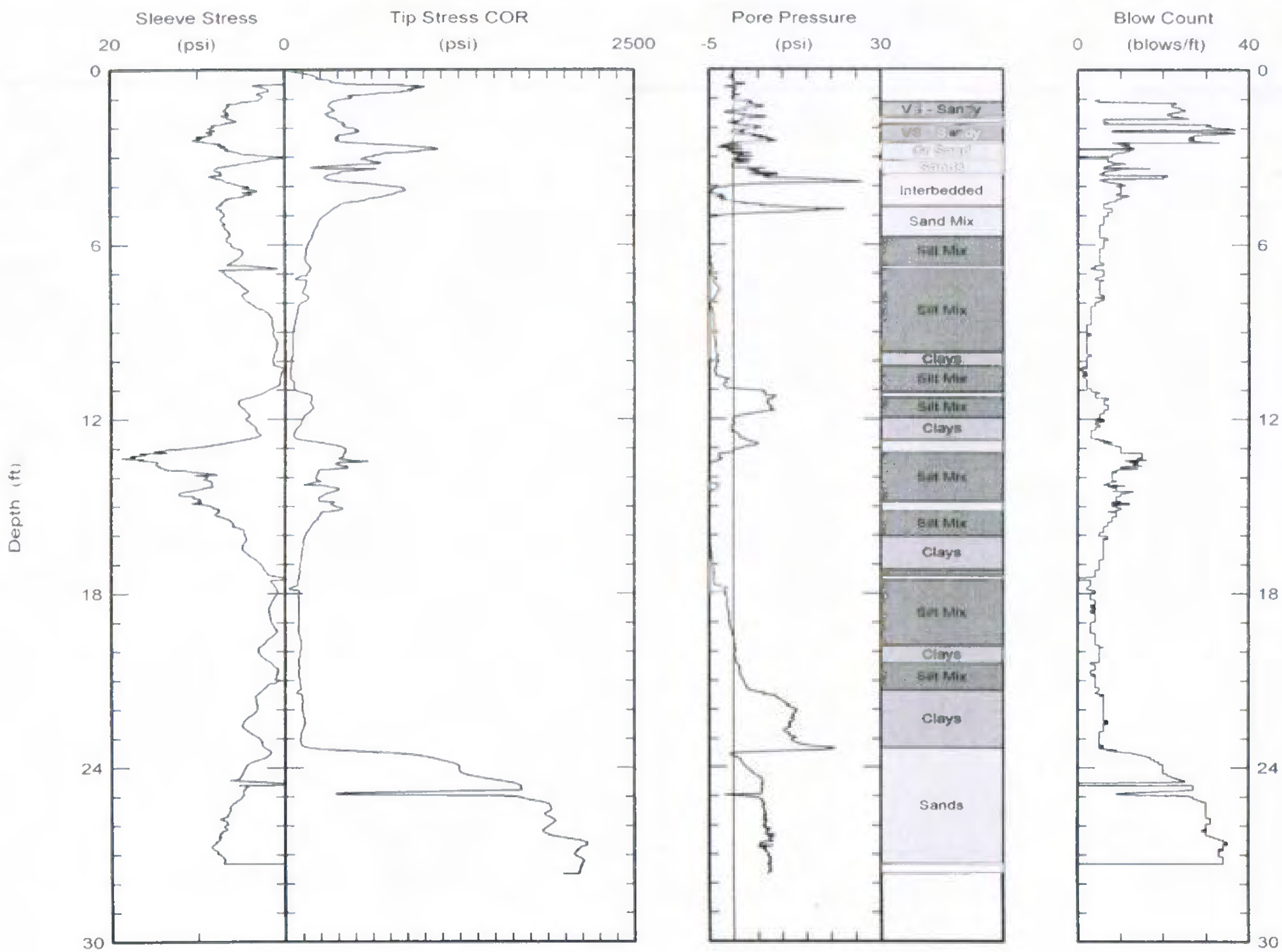
Maximum depth: 4.06 (ft)

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt13 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



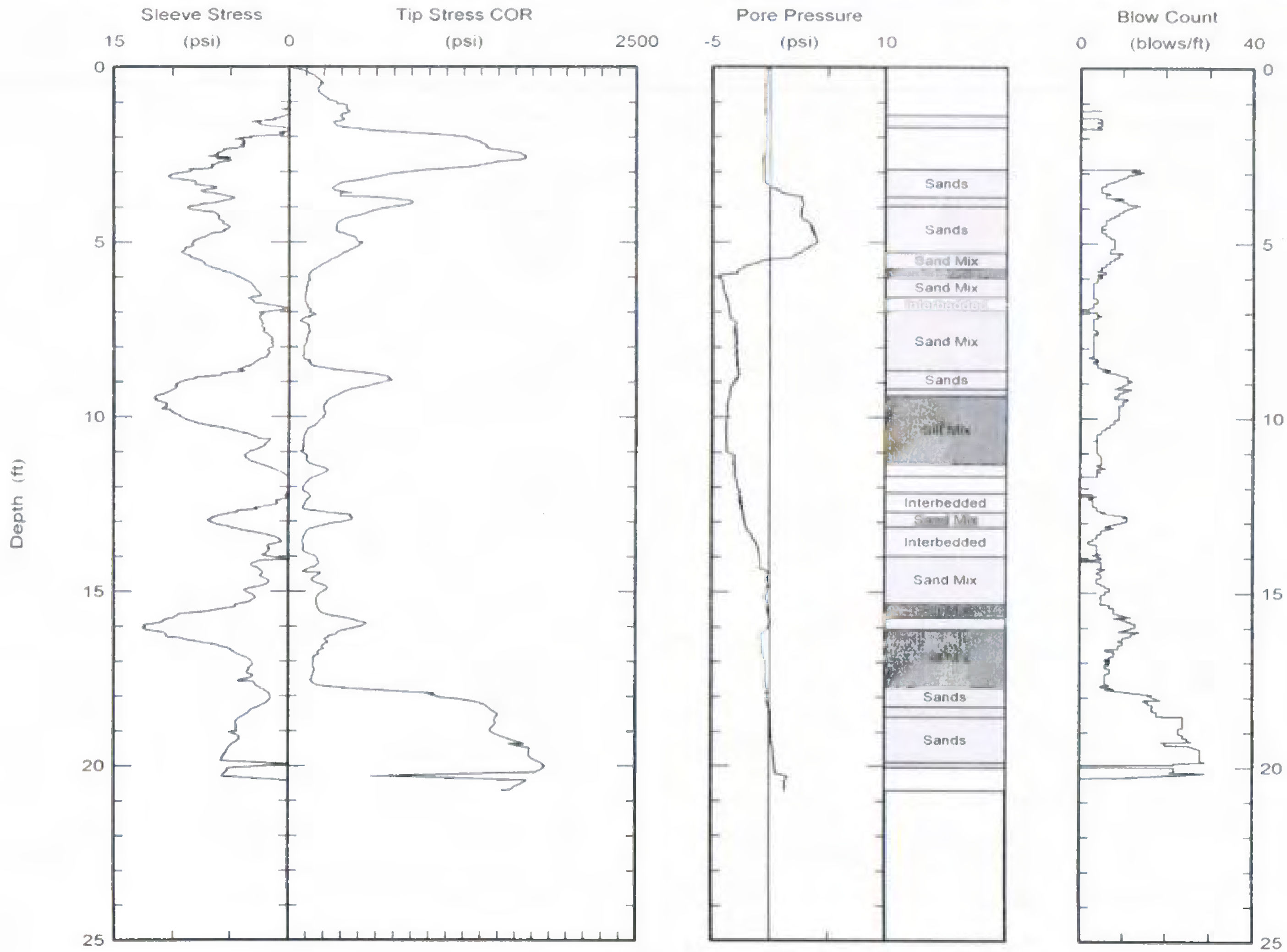
Maximum depth: 29.72 (ft)

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 15/May/2011 Test ID: cpt14 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 27.65 (ft)

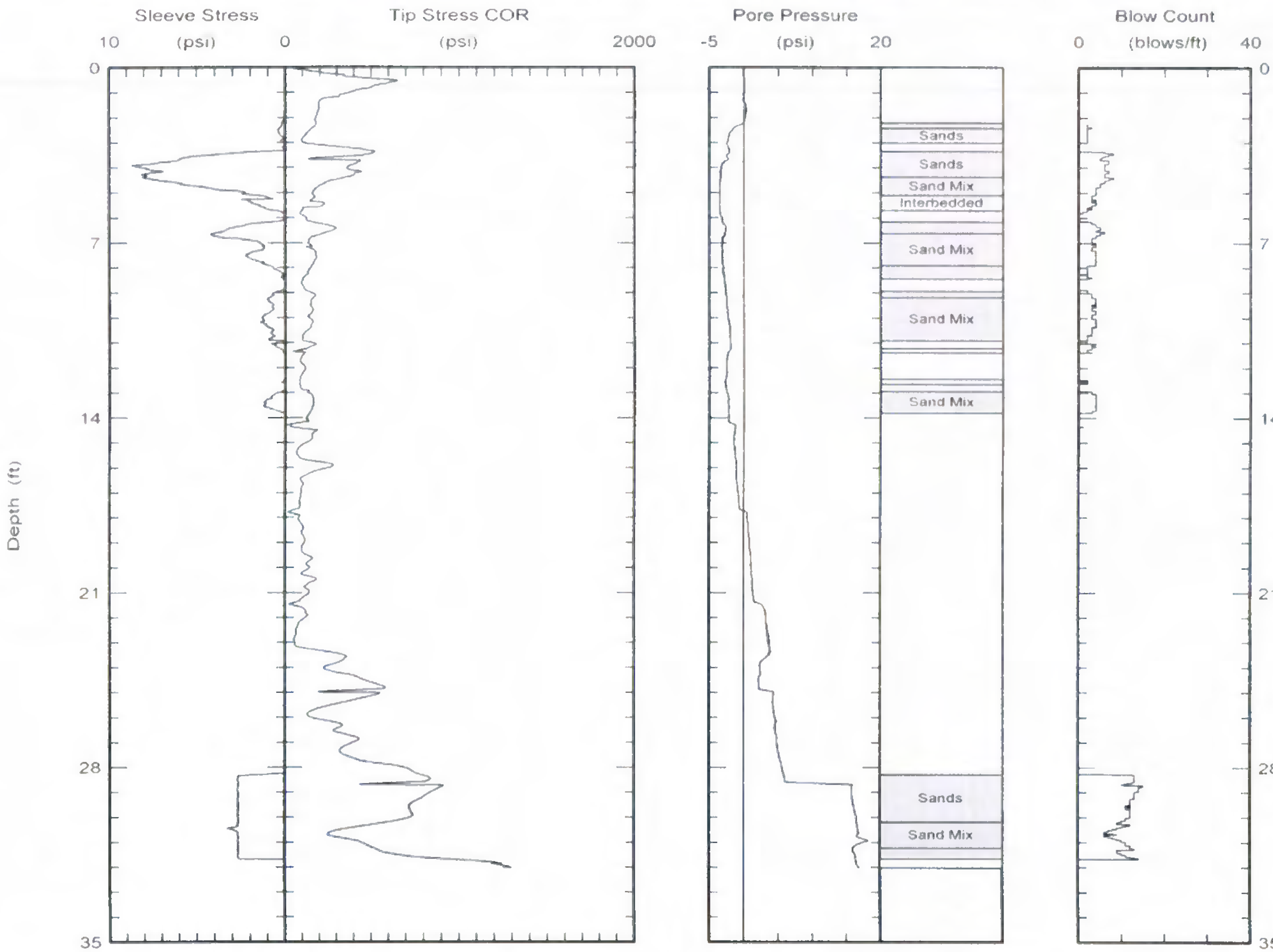
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 15/May/2011 Test ID: cpt15 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 20.70 (ft)

Test ID: cpt15
File: A15Y1102C.ECP

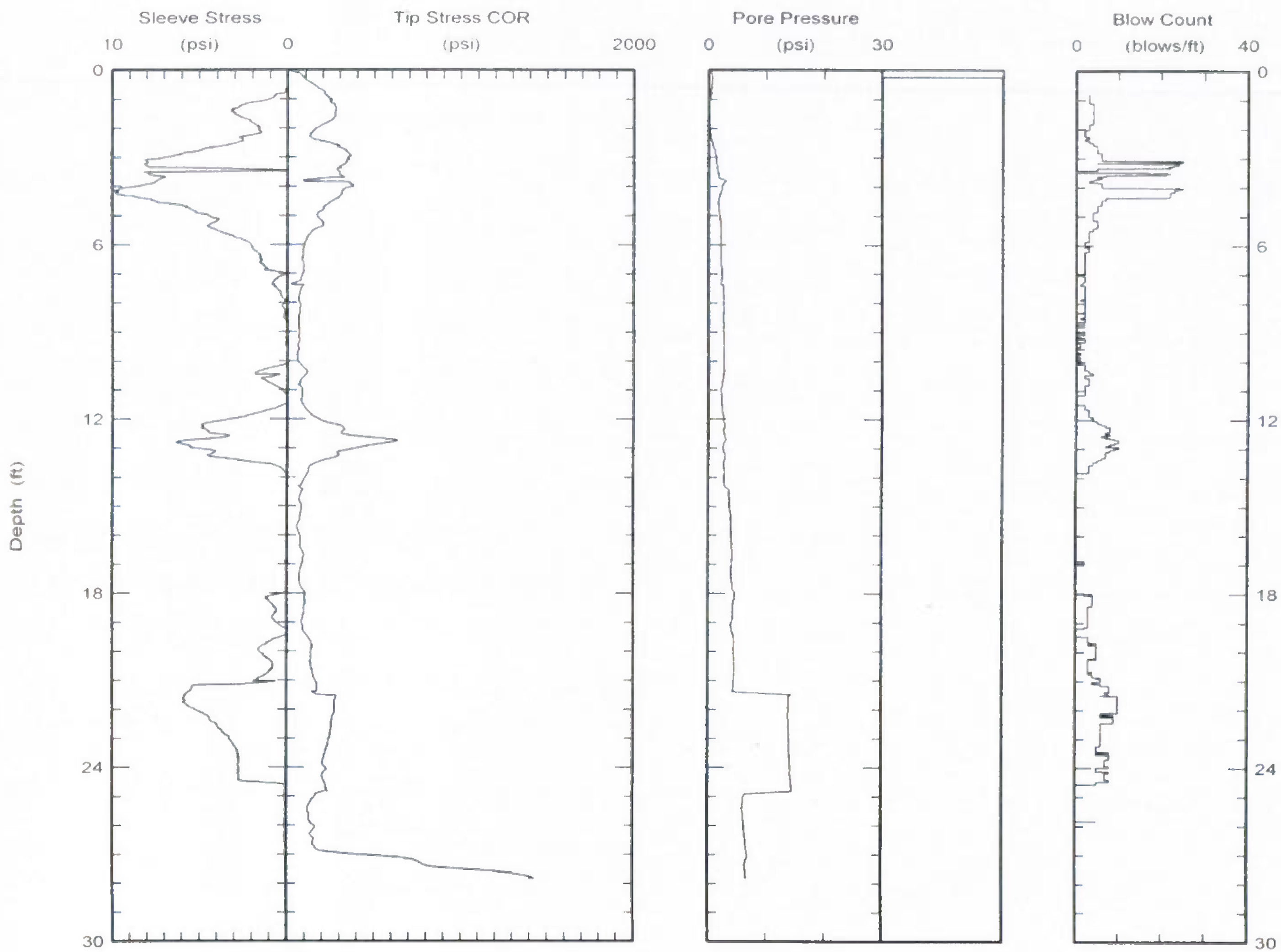
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 15/May/2011 Test ID: cpt16 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 32.02 (ft)

Test ID: cpt16
File: A15Y1103C ECP

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 15/May/2011 Test ID: cpt17 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



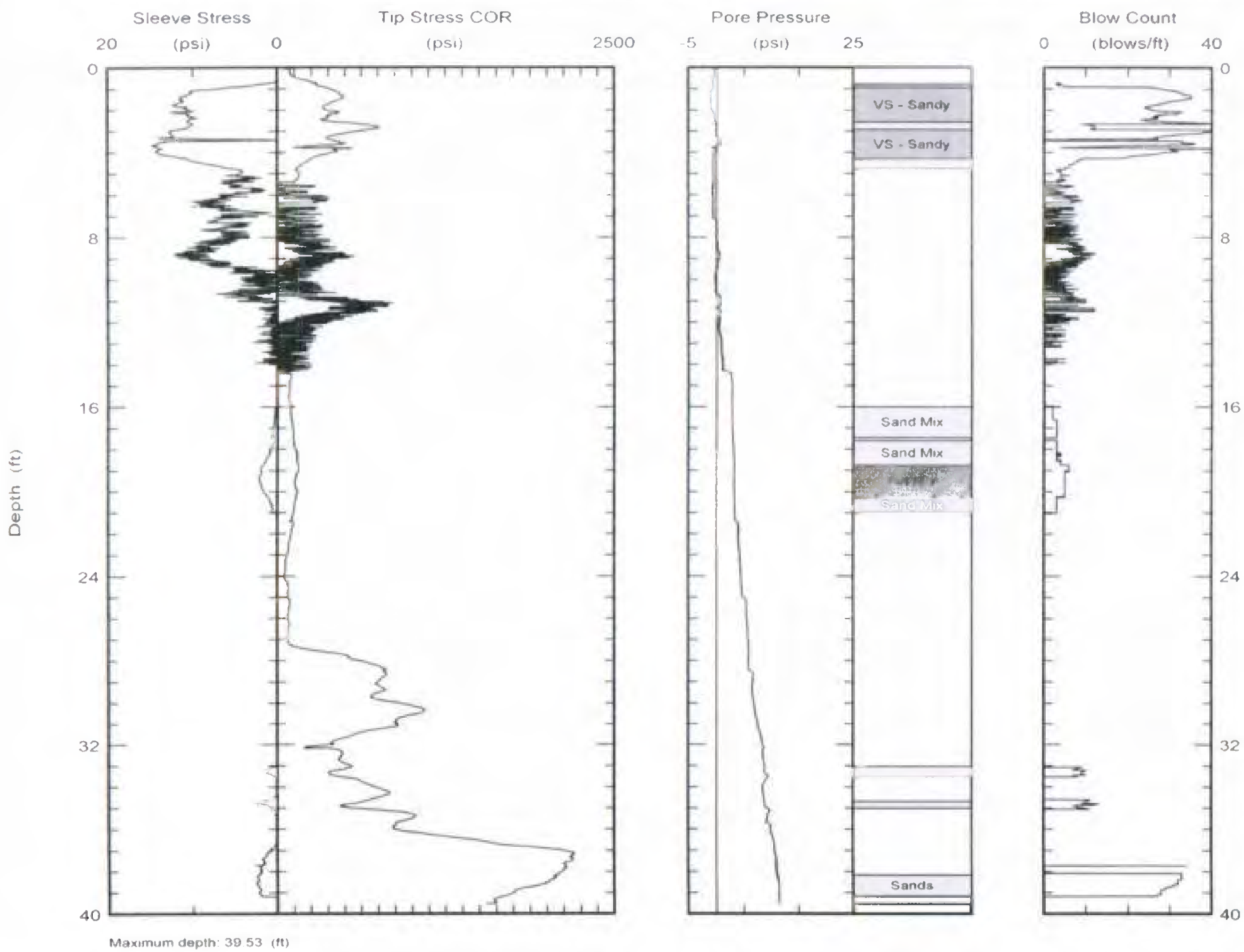
Maximum depth: 27.84 (ft)

Test ID: cpt17
File: A15Y1104C.ECP

Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

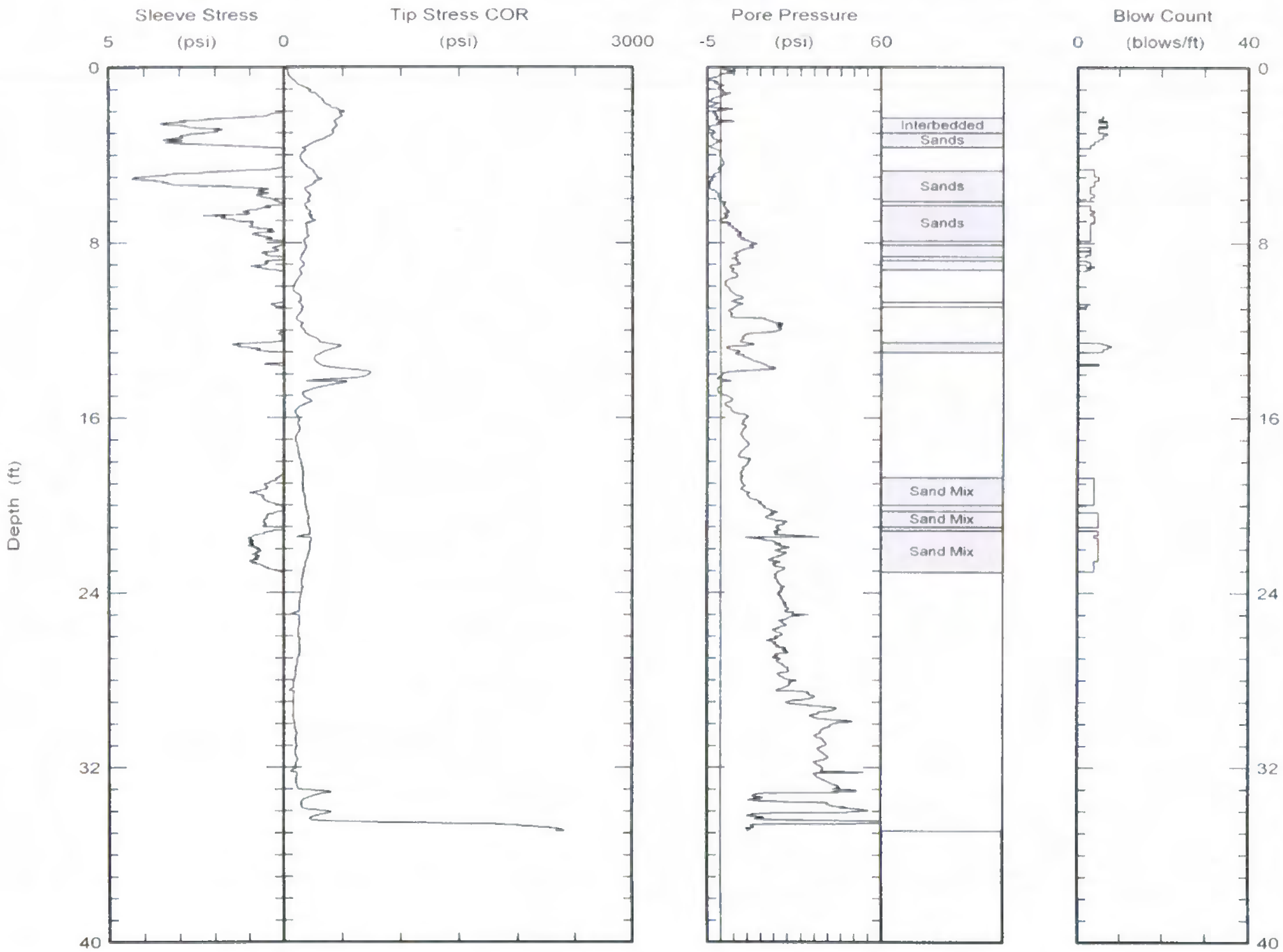
Northing:
Easting:
Elevation:
Client: Aetherdbs
Job Site: Burlington

Date: 15/May/2011
Test ID: cpt18
Project: Alliant



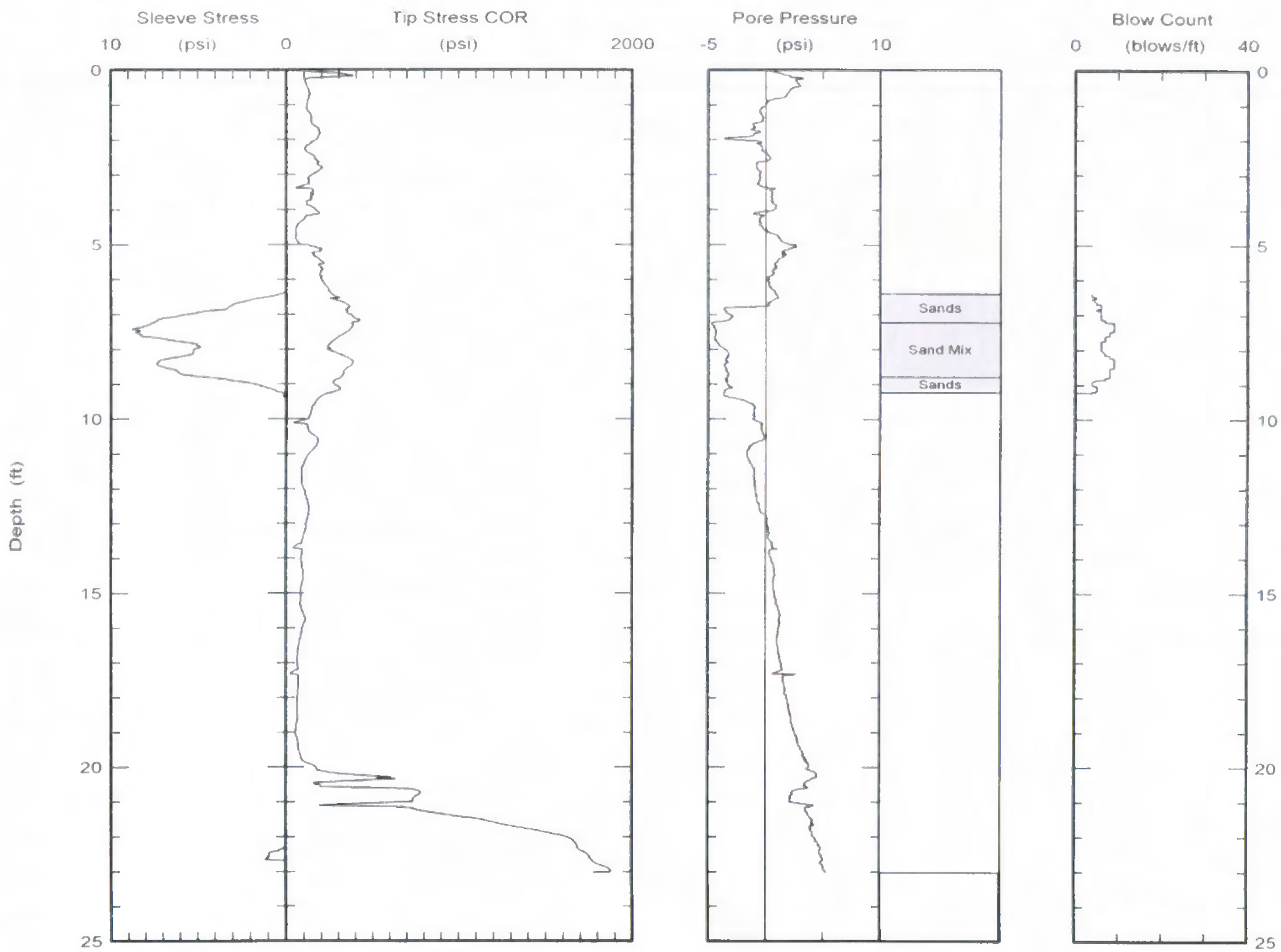
Test ID: cpt18
File: A15Y1105C.ECP

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 16/May/2011 Test ID: cpt19 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 34.90 (ft)

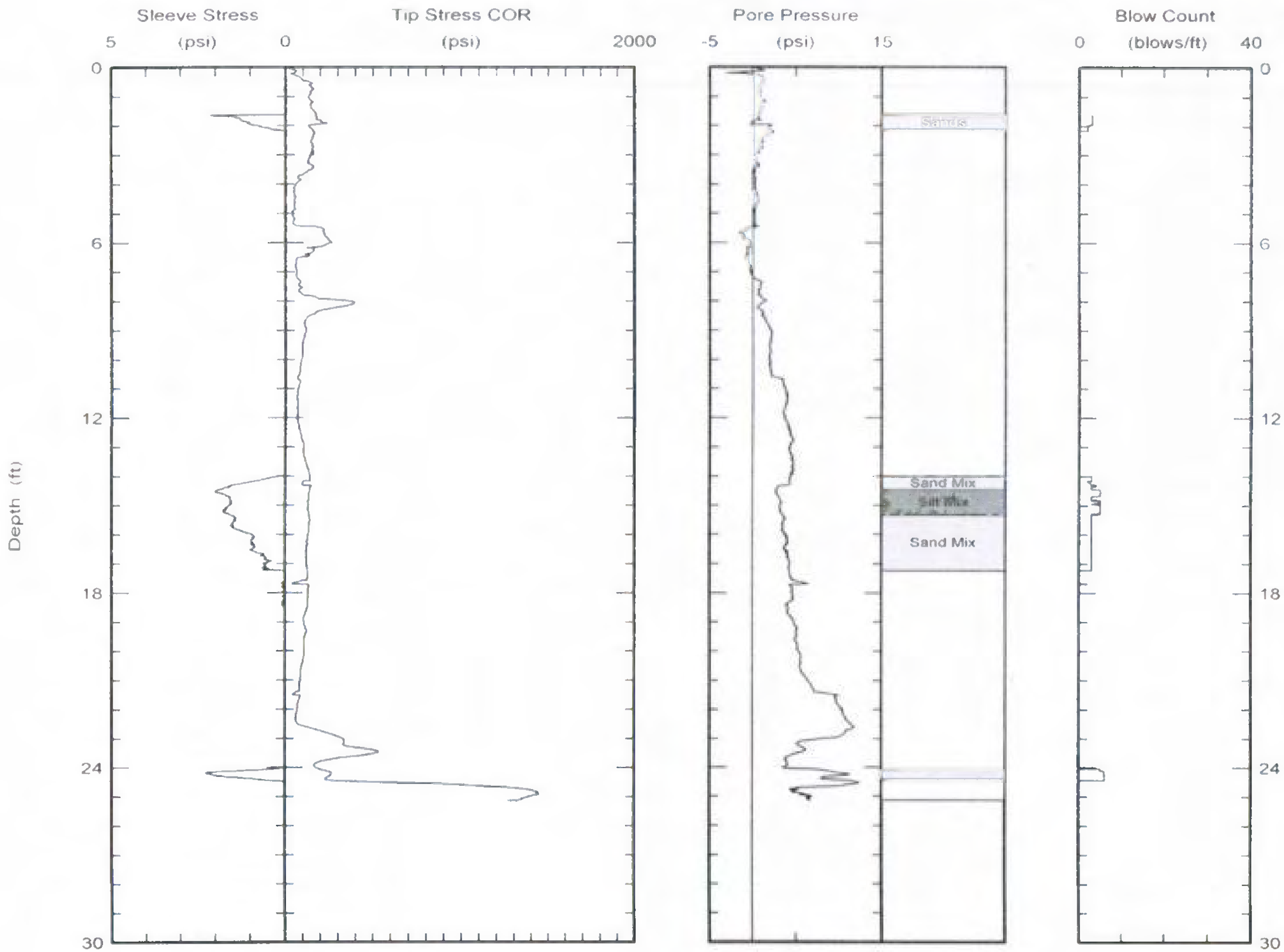
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 16/May/2011 Test ID: cpt20 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 23.02 (ft)

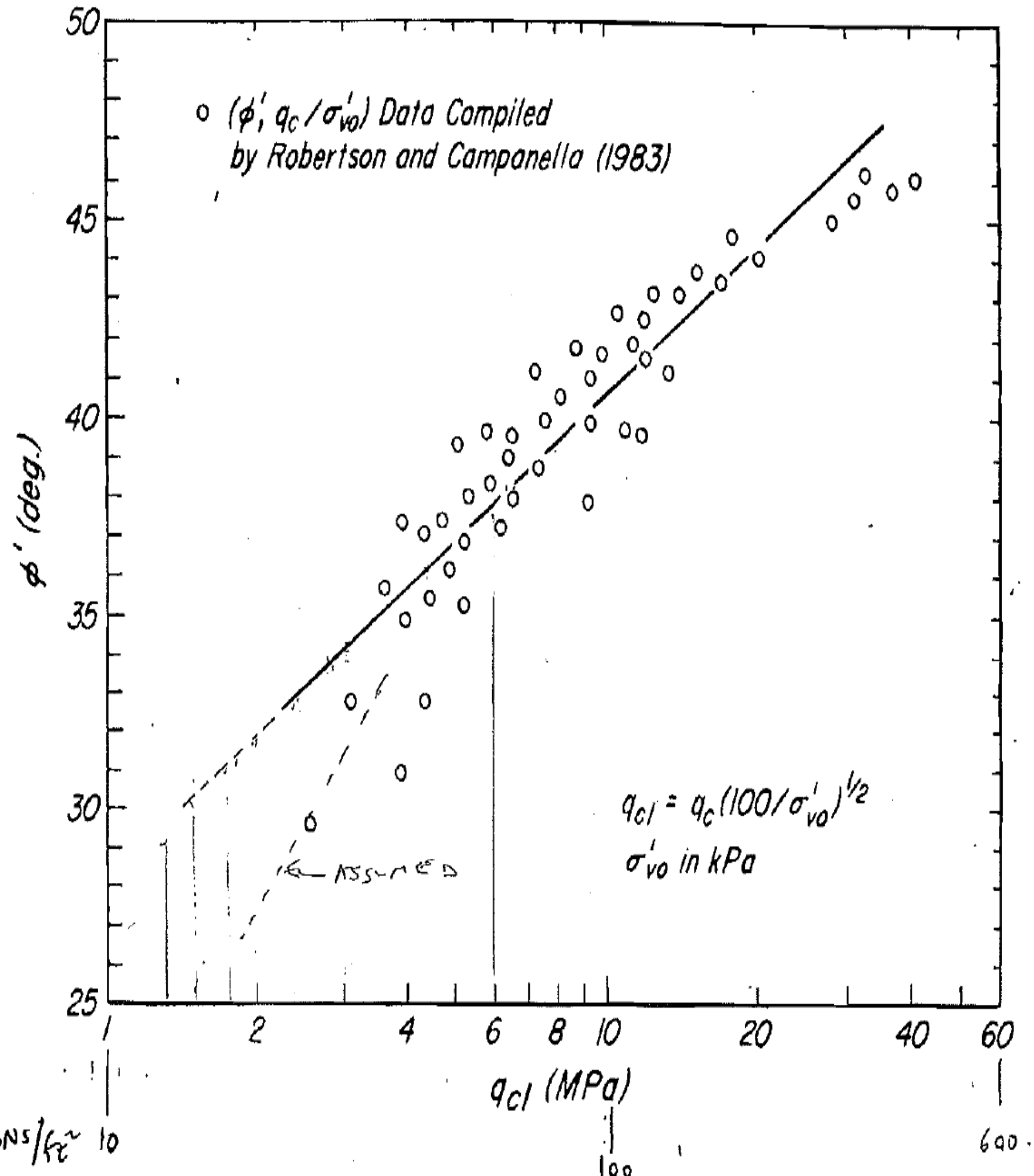
Test ID: cpt20
File: A16Y1102C.ECP

Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 16/May/2011 Test ID: cpt21 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Maximum depth: 25.13 (ft)

Test ID: cpt21
File: A16Y1103C.ECP



19.5 Empirical correlation between friction angle φ′ of sands and norma penetration resistance.

Re: TERZAGHI PECK & MESRI (1996), SOIL MECHANICS IN ENG. PRACTICE, 3RD ED., JOHN WILEY & SONS, INC

Attachment B

Boring / Geoprobe Logs

Burlington Generating Station

Source:
CABENO Environmental Field Services, LCC May 2011

Boring Log Legend

Sample
No: (Number) Soil samples are numbered consecutively from the ground surface. Core samples are numbered consecutively from the first core run.

Type:	A= Auger Cuttings	CR= Core Run	MS= Modified Spoon	PB= Pitcher Barrel
	PT= Piston Tube	ST= Shelby Tube	SS= Split Spoon (2" O.D.)	WC= Wash Cuttings

Interval: The depth of sampling interval in feet below ground surface

Blow Count
The number of blows required to drive a 2-inch O.D. split-spoon sampler with a 140 pound hammer falling 30-inches. When appropriate, the sampler is driven 18 inches and blow counts are reported for each 6-inch interval. The sum of blow counts for the last two 6-inch intervals is designated as the standard penetration resistance (N) expressed as blows per foot.

Recovery in Inches
The length of sample recovered by the sampling device.

U.S.C.S. Soil Type
The Unified Soil Classification System symbol for recovered soil samples determined by visual examination or laboratory tests. Refer to ASTM D2487-69 for a detailed description of procedure and symbols. Underlined symbols denote classifications based on laboratory tests (i.e. ML), all others are based on visual classification only.

Percent Moisture
Natural moisture content of sample expressed as percent of dry weight.

q_u TSF
Unconfined compressive strength in tons per square foot obtained by hand penetrometer. Laboratory compression test values are indicated by underlining.

Contact Depth
The contact depth between soil layers is interpreted from significant changes in recovered samples and observations during drilling. Actual changes between soil layers often occur gradually and the contact depths shown on the boring logs should be considered as approximate.

Soil Description and Remarks
Soil descriptions include consistency or density, color, predominant soil types and modifying constituents.

Cohesive Soils			Cohesionless Soils	
Consistency	q_u (TSF)	Blows/ft.	Density	Blows/ft.
Very Soft	less than 0.25	0-1	Very Loose	4 or less
Soft	0.25 to 0.50	2-4	Loose	5 to 10
Medium Stiff	0.50 to 1.00	5-8	Medium Dense	11 to 30
Stiff	1.00 to 2.00	9-15	Dense	30 to 50
Very Stiff	2.00 to 4.00	15-30	Very Dense	Over 50
Hard	more than 4.00	Over 30		

Particle Size Description		Definition of Terms	
Boulder =	Larger than 12 inches	Trace =	5 to 12 percent by weight
Cobble =	3 to 12 inches	Some =	12 to 30 percent by weight
Gravel =	0.187 to 3 inches	And =	Approximately equal fractions
Sand =	0.074 to 4.76 mm	( ) =	Driller's observation
Silt and Clay =	smaller than 0.074 mm		

Piezo.
(Piezometer) Screened interval of the piezometer installation is denoted by cross-hatching.

General Note
The boring log and related information depicted subsurface conditions only at the specified locations and date indicated. Soil conditions and water levels at other locations may differ from conditions occurring at these boring locations. Also the passage of time may result in a change in the conditions at these boring locations.

Soil Test Boring Refusal
Defined as any material causing a blow count greater that 50 blows/6 inches. Such material may include bedrock, "floating" rock slabs, boulders, dense gravel seams, hard pan clay, or cemented soils. Refusal is usually indicated in fractional notation showing number of blows as the numerator and inches of penetration as the denominator.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB1 (CPT1)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	2.5'/5'		
	SP2	5'/5'		
	SP3	5'/5'		
▽	SP4	5'/5'		
	SP5	0'/5'		
	SP6	5'/5'		
	SP7	1.5'/5'		2.75 2.75 3.25 3.75 1.5
	SP8	5'/5'		

DEPTH IN FEET	DESCRIPTION
0 to -20	ASH; brown; poorly graded; fine grained; moist. (Fill) @ 14' grades dark gray to black.
-20 to -31	Clayey SILT; black to gray; non-plastic to low plasticity; moist to wet; some organic matter. (OL) @ too soft for pocket penn from 19.5' to 31', no hammer required to push sampler.
-31 to -37	CLAY; gray to black; high plasticity; soft to firm; moist; trace organic. (OH)
-37 to -39	Sandy SILT; gray; non-plastic; wet. (ML)
-39 to -40	SAND; gray; well graded; fine to coarse grained; rounded to sub-rounded; wet. (SW)

Bottom of Boring @ 40'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

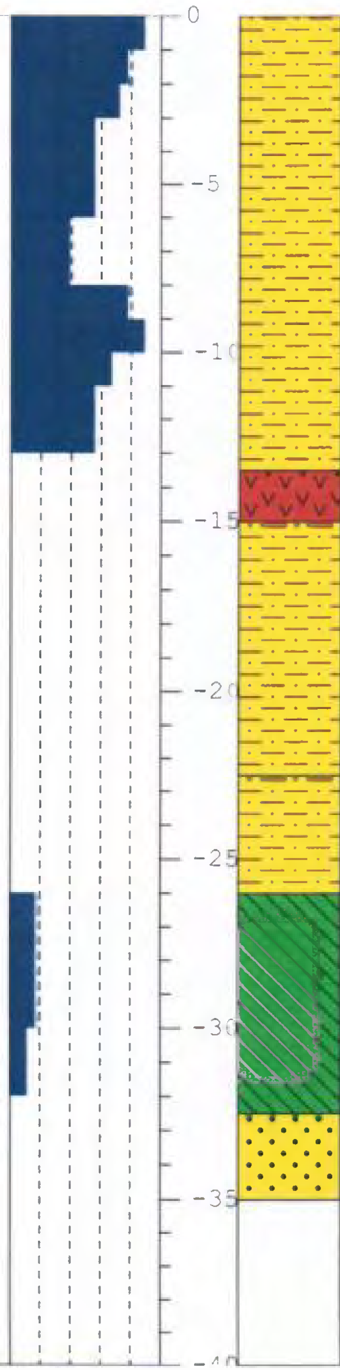
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB2 (CPT7)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	5'/5'		4.0, 3.5, 3.25, 2.5, 2.5
	SP2	5'/5'		2.5, 1.75, 1.75, 3.5, 4.0
	SP3	5'/5'		3.0, 2.5, 2.5
	SP4	4'/5'		
▽	SP5	4'/5'		
	SP6	5'/5'		0.75, 0.75, 0.75, 0.75, 0.5, 0.5
	SP7	4'/5'		

CONSISTENCY vs. DEPTH / DEPTH IN FEET / PROFILE



DESCRIPTION

Depth (ft)	Description
0 – ~13.5	Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)
~13.5 – ~15	ASH; black; non-plastic; moist. (FILL)
~15 – ~22.5	Clayey SILT; gray to black; non-plastic; trace organic matter/shells. (OL)
~22.5 – ~26	SILT; gray; non-plastic; wet. (ML)
~26 – ~32.5	CLAY; gray to black; soft; high plasticity; moist; trace to some organic matter. (OH)
~32.5 – 35	SAND; gray; poorly graded; medium grained; wet. (SP)

Bottom of boring @ 35'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

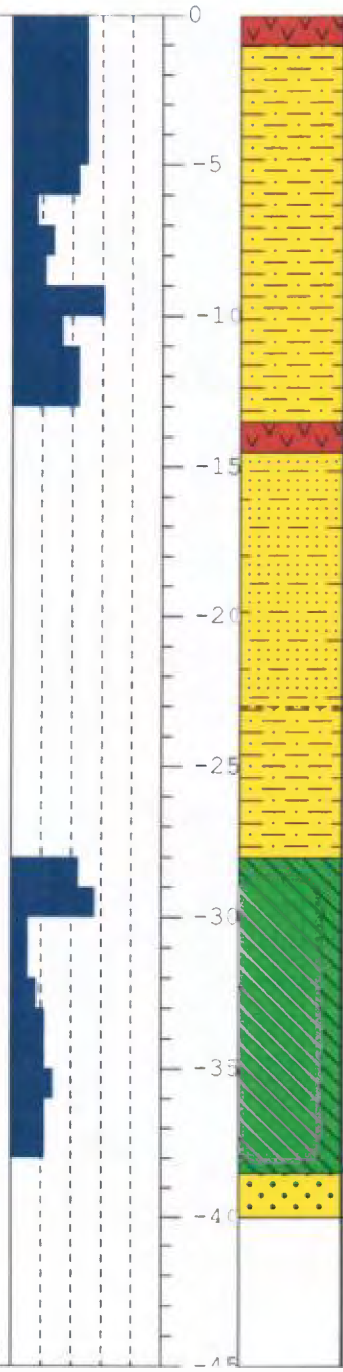
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB3 (CPT10)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	3.5'/5'		2.25, 2.25, 2.25, 2.25, 2.25
	SP2	5'/5'		2.0, 0.75, 1.25, 1.0, 2.75
∇	SP3	5'/5'		1.5, 2.0, 2.0
	SP4	5'/5'		
	SP5	5'/5'		
	SP6	5'/5'		2.0, 2.5, 0.5
	SP7	5'/5'		0.5, 0.75, 1.0, 1.0, 1.25
	SP8	5'/5'		1.0, 1.0, 1.0

CONSISTENCY vs. DEPTH | DEPTH IN FEET | PROFILE



DESCRIPTION

ASH; brown; non-plastic; moist. (FILL)

Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)

ASH; gray; non-plastic; moist. (FILL)

Silty SAND; dark gray to light gray; poorly graded; fine grained; wet. (SP)

SILT; gray; non-plastic; wet. (ML)

Silty CLAY; gray to black; soft; low plasticity; moist; trace to some organic matter. (OH)

SAND; gray; poorly graded; fine grained; wet. (SP)

Bottom of boring @ 40'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB4 (CPT6)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	DEPTH IN FEET	DESCRIPTION
	SP1	4.5'/5'		2.25 3.25 3.0	0	Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)
						ASH; gray; non-plastic; moist. (FILL)
	SP2	5'/5'			-5	
	SP3	5'/5'			-10	
	SP4	5'/5'			-15	
▽	SP5	3.5'/5'			-20	
						SILT; gray; non-plastic; wet. (ML)
	SP6	4'/5'			-25	
	SP7	5'/5'		1.25 1.25 1.25 1.25	-30	CLAY; gray to black; low to high plasticity; wet; some organic matter. (OL/OH)
						SAND; gray; poorly graded; fine grained; wet. (SP)
					-35	Bottom of boring @ 35'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CONSISTENCY vs. DEPTH | PROFILE

-40

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB5 (cpt19)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	5'/5'		
				1.25
				2.75
	SP2	5'/5'		2.75
				1.5
				1.25
				0.5
				1.75
	SP3	4'/5'		2.0
	SP4	4'/5'		
				0.5
				1.25
				1.5
				1.25
	SP5	3.5'/5'		1.5
				1.25
				1.25
				1.25
				1.25
				1.25
	SP6	3.5'/5'		1.5
▽				1.25
	SP7	3'/5'		

CONSISTENCY vs. DEPTH | DEPTH IN FEET: 0, -5, -10, -15, -20, -25, -30, -35, -40 | PROFILE

DESCRIPTION

SILT; brown; non-plastic; dry to moist; trace organic matter. (Fill)

@ 5' grades Clayey SILT; low plasticity; firm to stiff.

Sandy CLAY; black to dark gray; non-plastic to low plasticity; moist. (CL)

CLAY; black to dark gray; low to high plasticity; moist; trace organic matter. (CL)

Sandy CLAY; dark gray; low to high plasticity; wet; trace silt. (CL)

@ 33' grades several thin sand seams.

SAND; gray; poorly graded; coarse grained; wet. (SP)

Bottom of boring @ 35'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* / *E NOT SURVEYED*

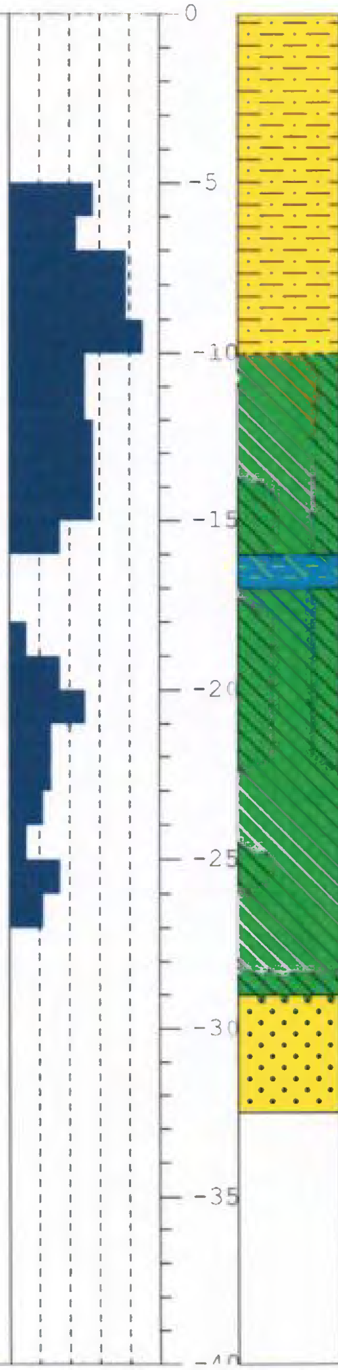
BORING NO.: *SB6 (cpt18)*

LOGGED BY:	*John Noyes*
EDITED BY:	*John Noyes*
CHECKED BY:	*Chris Sullivan*
DATE BEGAN:	*05-16-11*
DATE FINISHED:	*05-16-11*
GROUND SURFACE ELEVATION:	

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION
	SP1	5'/5'	
	SP2	5'/5'	
	SP3	5'/5'	
∇			
	SP4	4.5'/5'	
	SP5	2.5'/5'	
	SP6	3.8'/5'	
	SP7	2.5'/2.5'	

POCKET PENETROMETER (TONS/FT2): 2.5, 2.0, 3.5, 3.5, 4.0, 2.25, 2.25, 2.5, 2.5, 2.5, 2.5, 1.5, 0.5, 1.5, 2.25, 1.25, 1.25, 1.0, 0.5, 1.5, 1.0, 0, 0, 0

CONSISTENCY vs. DEPTH / DEPTH IN FEET / PROFILE



DESCRIPTION

SILT; brown; non-plastic; dry to moist; trace organic matter (FILL)

@ 5' grades Clayey SILT; low plasticity; very stiff.

CLAY; gray to olive; low to high plasticity; stiff to very stiff; moist; trace organic matter (Fill)

Clayey SAND; gray; poorly graded; medium grained; wet. (SP)

CLAY; gray to olive; high plasticity; very soft to firm; moist to wet. (CL)

@ 19' is a thin 1" sand seam, wet.

SAND; gray; well graded; fine to coarse grained; wet. (SW)

Bottom of boring @ 32.5'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

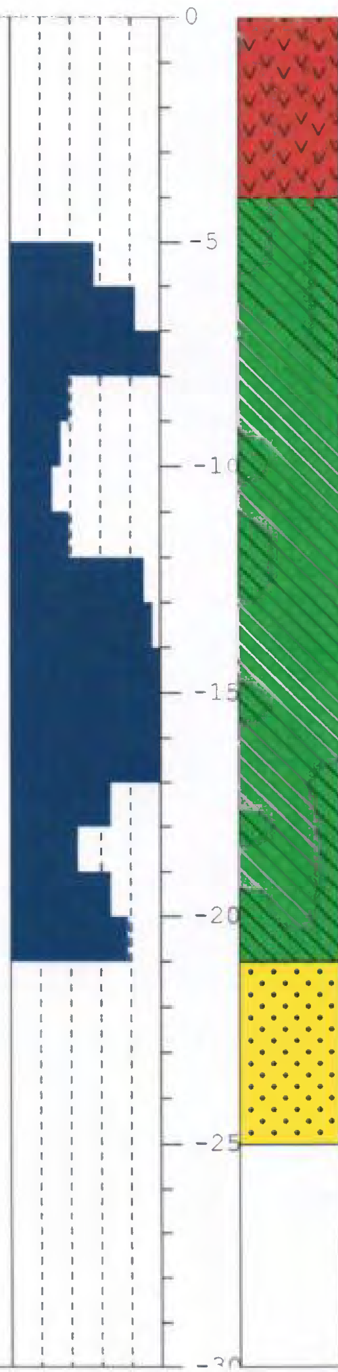
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB7 (cpt15)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	3.8'/5'		
				2.5
				3.75
				>4.5
	SP2	5'/5'		1.75
				1.5
				1.25
				1.75
				4.0
	SP3	5'/5'		4.25
				4.5
				4.5
				>4.5
				3.0
	SP4	5'/5'		2.0
▽				3.0
				3.5
	SP5	3'/5'		

CONSISTENCY vs. DEPTH / DEPTH IN FEET / PROFILE



DESCRIPTION

ASH; gray; fine grained; moist. (Fill)

CLAY; black; low plasticity; stiff to very stiff; moist; trace organic matter (Fill)

@ 18' grades (OH)

@ 19' is a 6-inch SAND seam; fine grained; wet.
@ 20' grades high plasticity.

SAND; gray; poorly graded; fine grained; wet. (SW)

Bottom of boring @ 25'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: ***SB8 (cpt13)***

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	4'/5'		
∇	SP2	4'/5'		2.75 3.5
	SP3	5'/5'		3.0 4.5
	SP4	4'/5'		1.75 1.75 1.0 2.25 2.0
	SP5	4.5'/5'		

DEPTH IN FEET	DESCRIPTION
0	SILT; brown; non-plastic; dry to moist; trace to some gravel, sand & ash. (Fill)
	SAND; gray; fine grained; poorly graded; wet. (SP)
	CLAY; gray; low to high plasticity; stiff; moist. (CL)
-10	SAND; gray to black; fine grained; poorly graded; wet. (SP)
	CLAY; gray; low to high plasticity; stiff; moist. (CL)
	SAND; gray; well graded; fine to coarse grained; wet. (SW)
-15	CLAY; dark gray; high plasticity; firm to stiff; moist; trace organic matter. (OH)
-20	SAND; gray to black; poorly graded; fine grained; wet. (SP)
-25	Bottom of boring @ 25'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

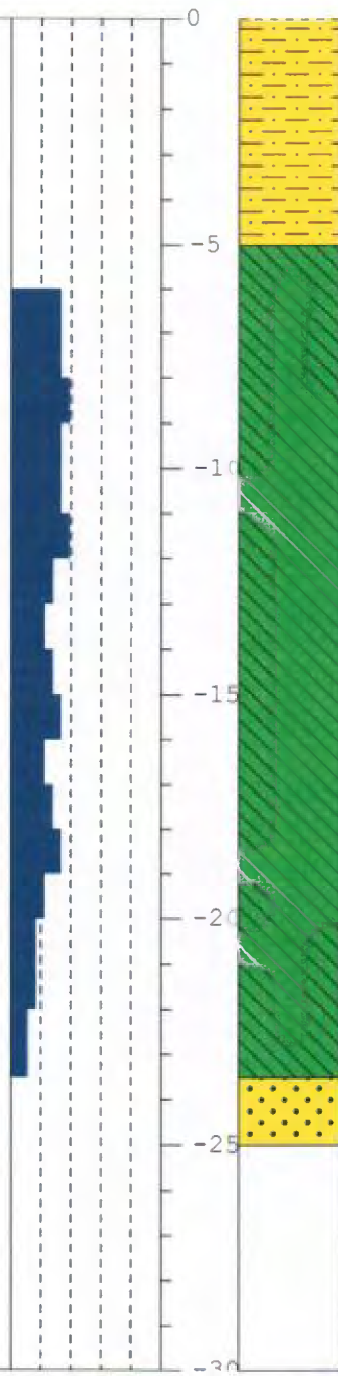
COORDINATES: *N NOT SURVEYED* / *E NOT SURVEYED*

BORING NO.: *SB9 (cpt21)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	2.5'/5'		
				1.5
				1.5
	SP2	4'/5'		1.75
				1.5
				1.5
				1.75
				1.25
	SP3	4.5'/5'		1.0
				1.25
				1.5
				1.0
				1.25
	SP4	5'/5'		1.5
				1.0
				0.75
				0.75
				0.5
▽	SP5	3.5'/5'		0.5

CONSISTENCY vs. DEPTH / DEPTH IN FEET / PROFILE



DESCRIPTION

0–5: SILT; brown; non-plastic; dry to moist; trace organic matter. (Fill)

5–23.5: CLAY:gray to olive; low to high plasticity; moist; trace organics. (OH)

23.5–25: SAND; gray; fine grained; poorly graded; wet. (SP)

Bottom of boring @ 25'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* / *E NOT SURVEYED*

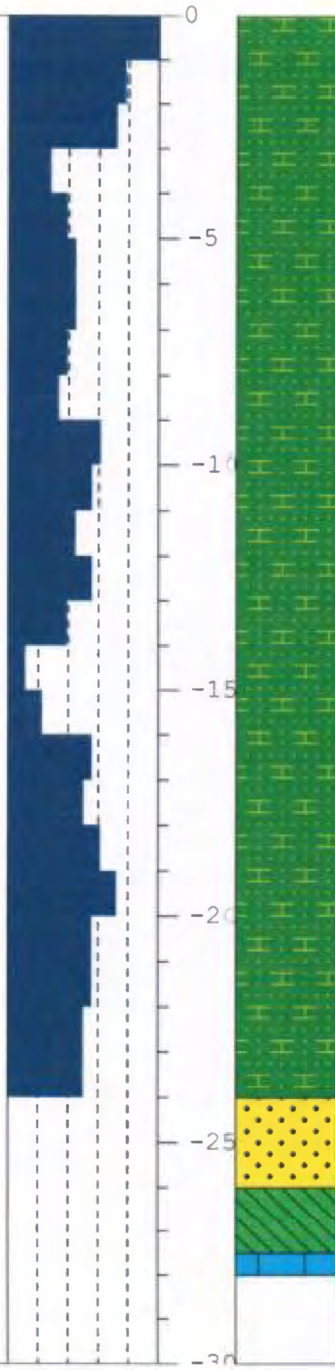
BORING NO.: *SB10*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION
	SP1	2.5'/5'	
	SP2	4'/5'	
	SP3	4.5'/5'	
	SP4	5'/5'	
	SP5	3.5'/5'	
▽			
	SP6	2'/3'	

POCKET PENETROMETER (TONS/FT2)
>4.5
3.5
3.25
1.25
1.75
2.0
2.0
1.75
1.5
2.75
2.5
2.0
2.5
1.75
0.5
1.0
2.5
2.25
2.75
3.25
2.5
2.5
2.25

CONSISTENCY vs. DEPTH | DEPTH IN FEET | PROFILE



DESCRIPTION

Silty CLAY; brown; low plasticity; firm to very stiff; moist; trace organics and gravels. (CL - OH)

SAND; gray to brown; well graded; fine to coarse grained; wet. (SW)

CLAY; gray; high plasticity; moist. (CL)

LIMESTONE; gray; thinly bedded; highly weathered. (Bedrock)

Bottom of boring @ 25'
Boring advanced W/ Geoprobe Model 6610DT using

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

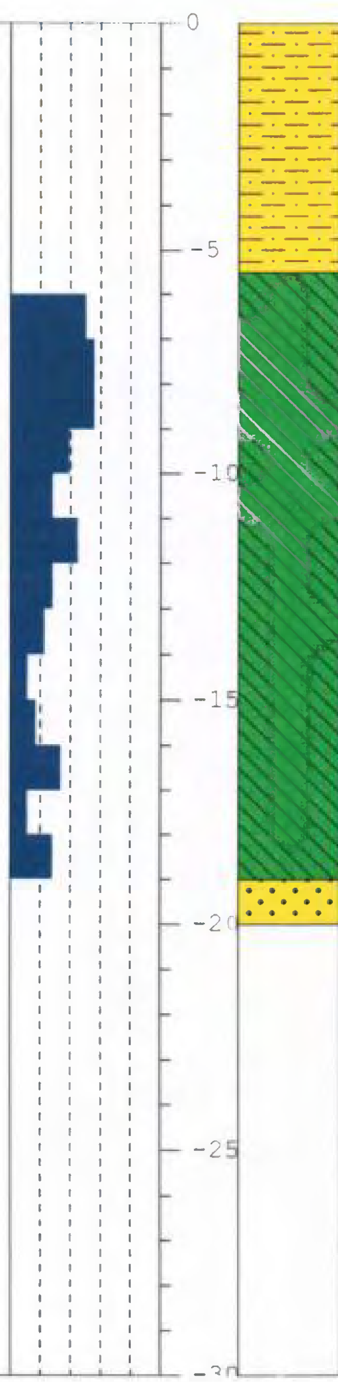
PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* / *E NOT SURVEYED*

BORING NO.: ***SB11***

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	2.5'/5'		
	SP2	4'/5'		2.25, 2.5, 2.5, 1.75, 1.25
▽	SP3	4.5'/5'		2.0, 1.25, 1.0, 0.5, 0.75
	SP4	5'/5'		1.5, 0.5, 1.25, 1.0



DESCRIPTION

Gravely SILT; brown; non-plastic; dry to moist. (Fill)

CLAY; brown; high plasticity; moist; stiff to soft; trace sand & gravel. (CL)

@ 11.5' grades black to gray, trace organics. (OH)

@ 14.5' are several thin, 1-inch, fine grained sand seams; wet.

SAND; gray; poorly graded; fine grained; wet. (SP)

Bottom of boring @ 20'

Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

PROJECT: Burlington, IA

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

BORING NO.: *SB12*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)
	SP1	2.5'/5'		
				2.5
				2.75
	SP2	5'/5'		1.75
				1.25
				1.25
				1.75
				1.5
	SP3	5'/5'		1.25
				0.75
				0.75
				1.25
				1.0
	SP4	4.5'/5'		0.75
				1.25
				1.5
				1.0
	SP5	5'/5'		0.75
				0.5
▽				

CONSISTENCY vs. DEPTH

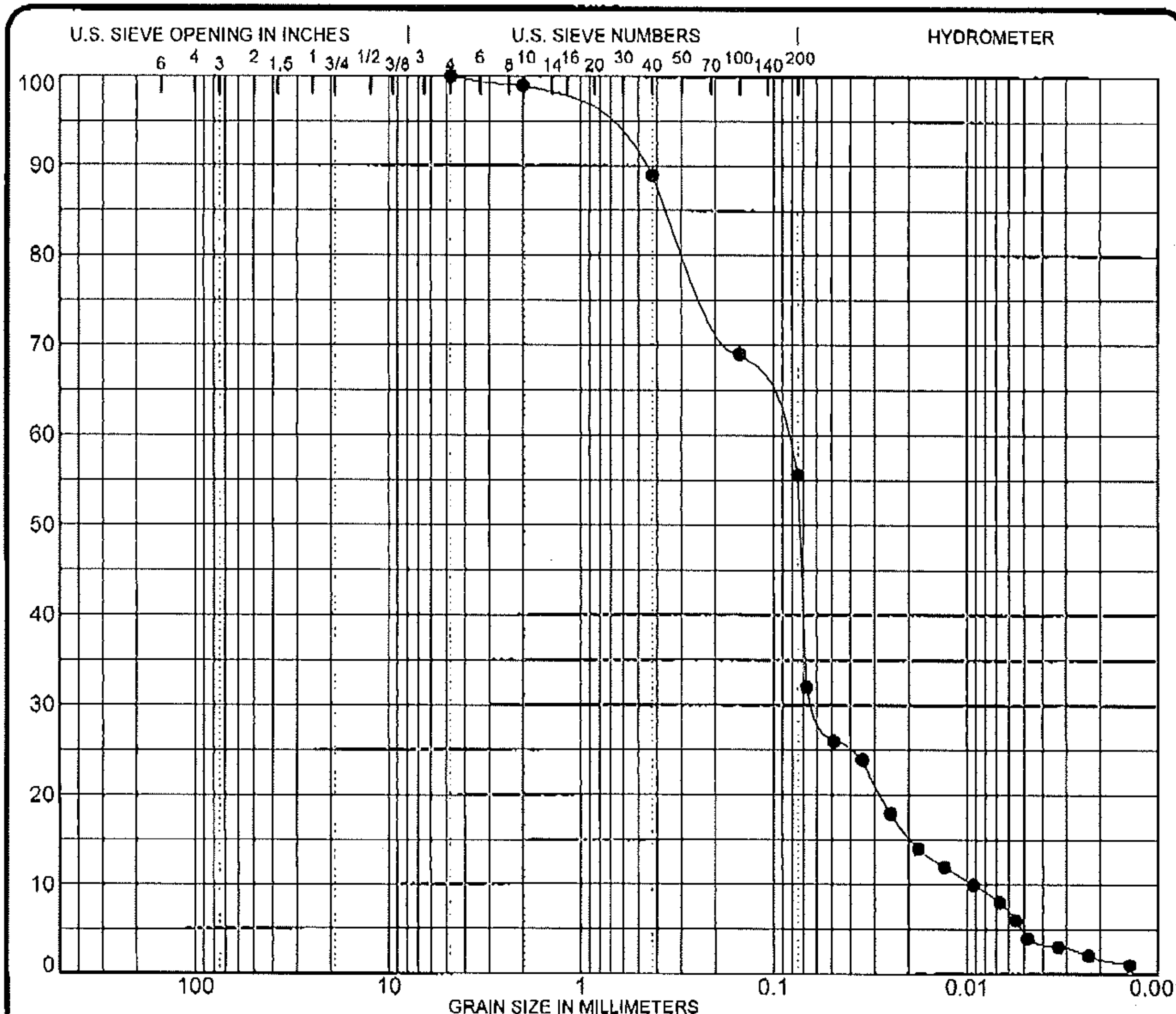
DEPTH IN FEET	DESCRIPTION
0	Gravely SILT; brown; non-plastic; dry to moist. (Fill)
-5	CLAY; brown; high plasticity; moist; stiff to soft; trace sand & gravel. (CL)
-15	@ 14' grades dark gray to black; trace organics. (OH)
-20	
-25	SAND; black to dark gray; poorly graded; fine grained; wet. (SP)
-30	Bottom of boring @ 25' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

Attachment C

Soil Laboratory Results

Burlington Generating Station

Source: Testing Service Corporation, May 2011



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Broing: SB-1	3 inch	100	Brown ASH			
Sample: Ash	2	100				
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	44	54	2
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	99	44.0	NP	NP	NP
	# 40	89				
	# 100	69				
	# 200	56				

PROJECT Geotechnical Testing
LOCATION ,

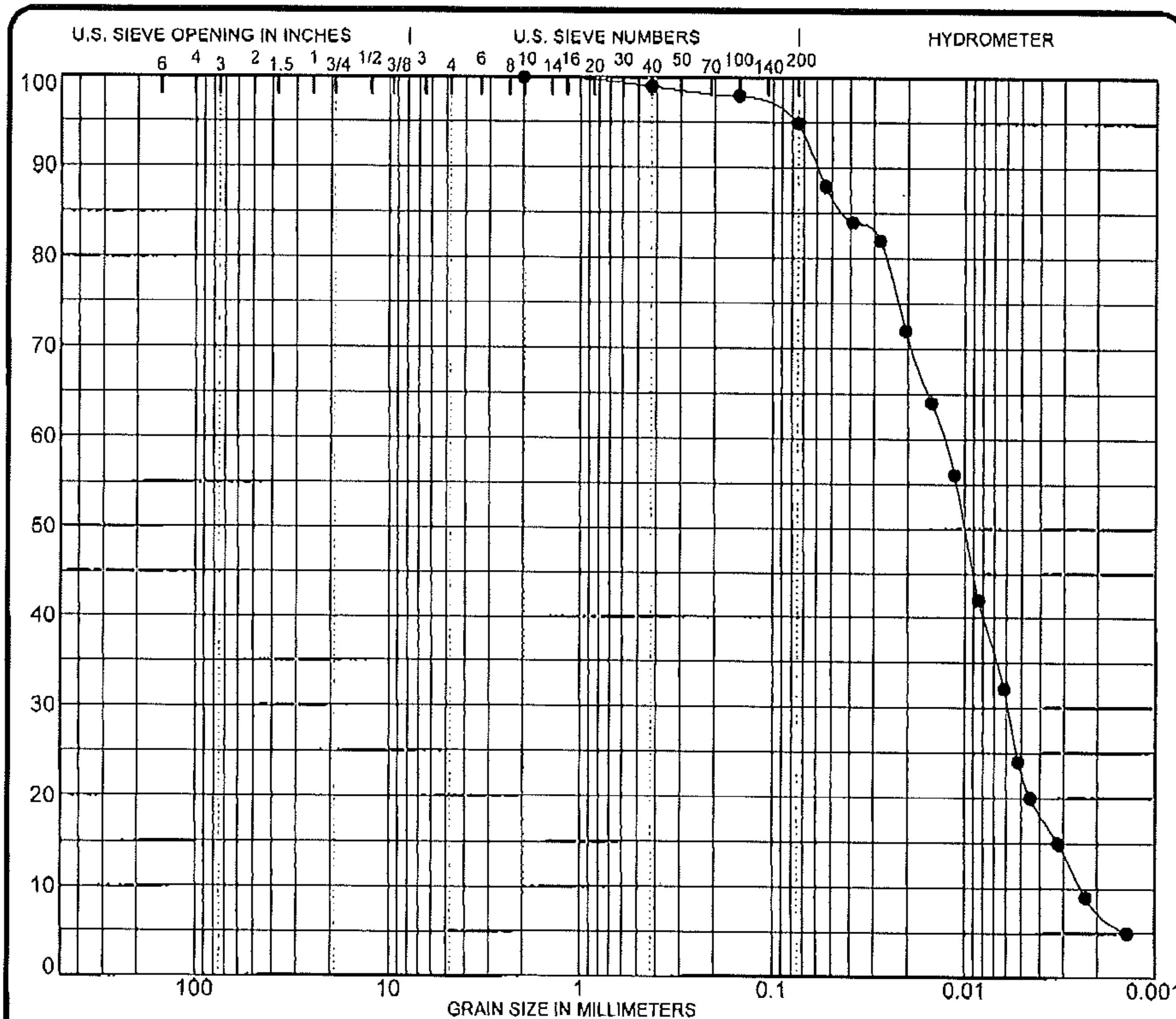
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

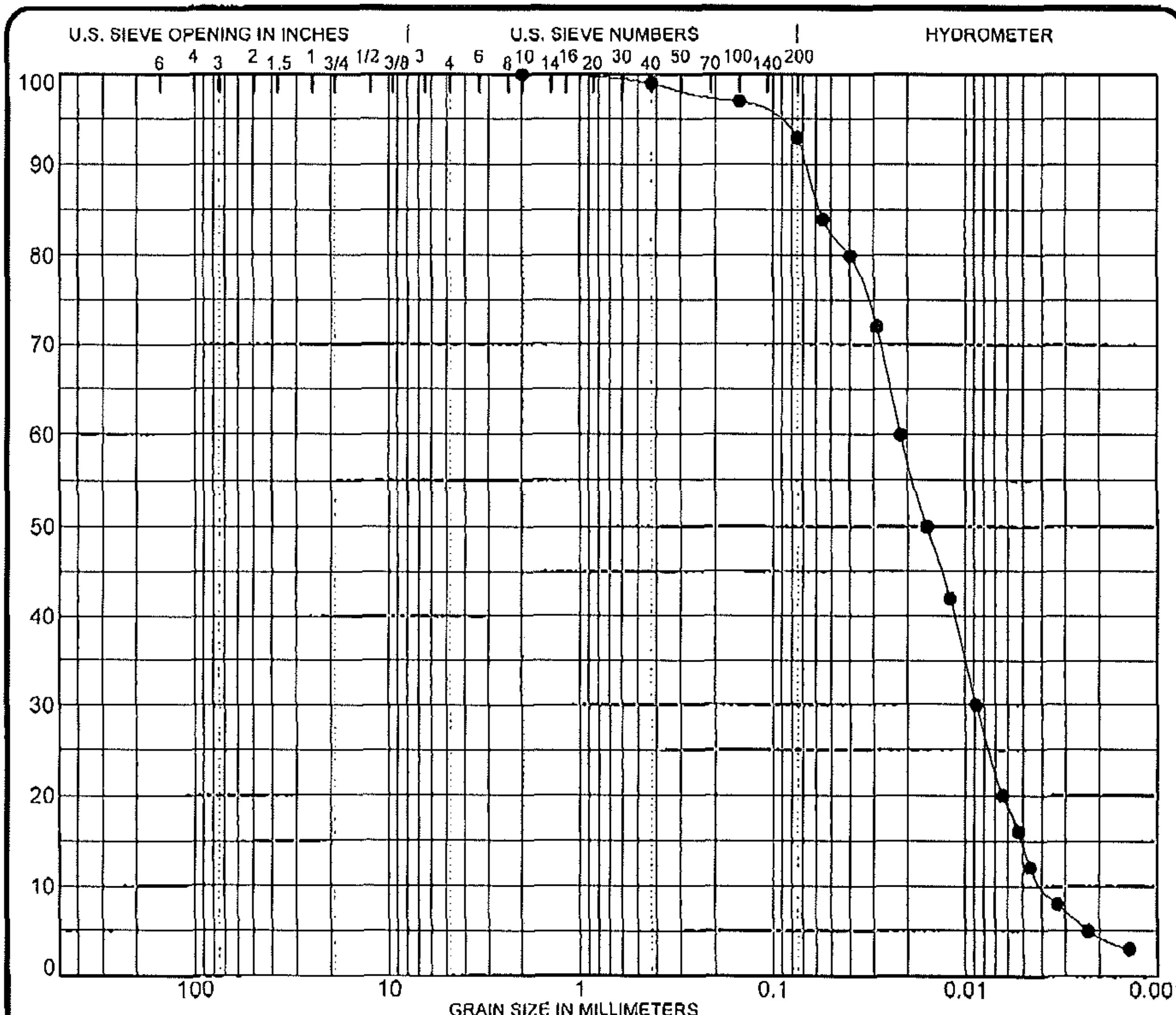
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-1	3 inch	100	Gray clayey SILT, trace sand (ML)			
Sample: A	2	100				
Depth: 25.0'-26.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	5	87	8
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	69.4	36	31	5
	# 40	99				
	# 100	98				
	# 200	95				

PROJECT Geotechnical Testing JOB NO. L - 76,757
LOCATION , DATE May 20, 2011
SB1

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

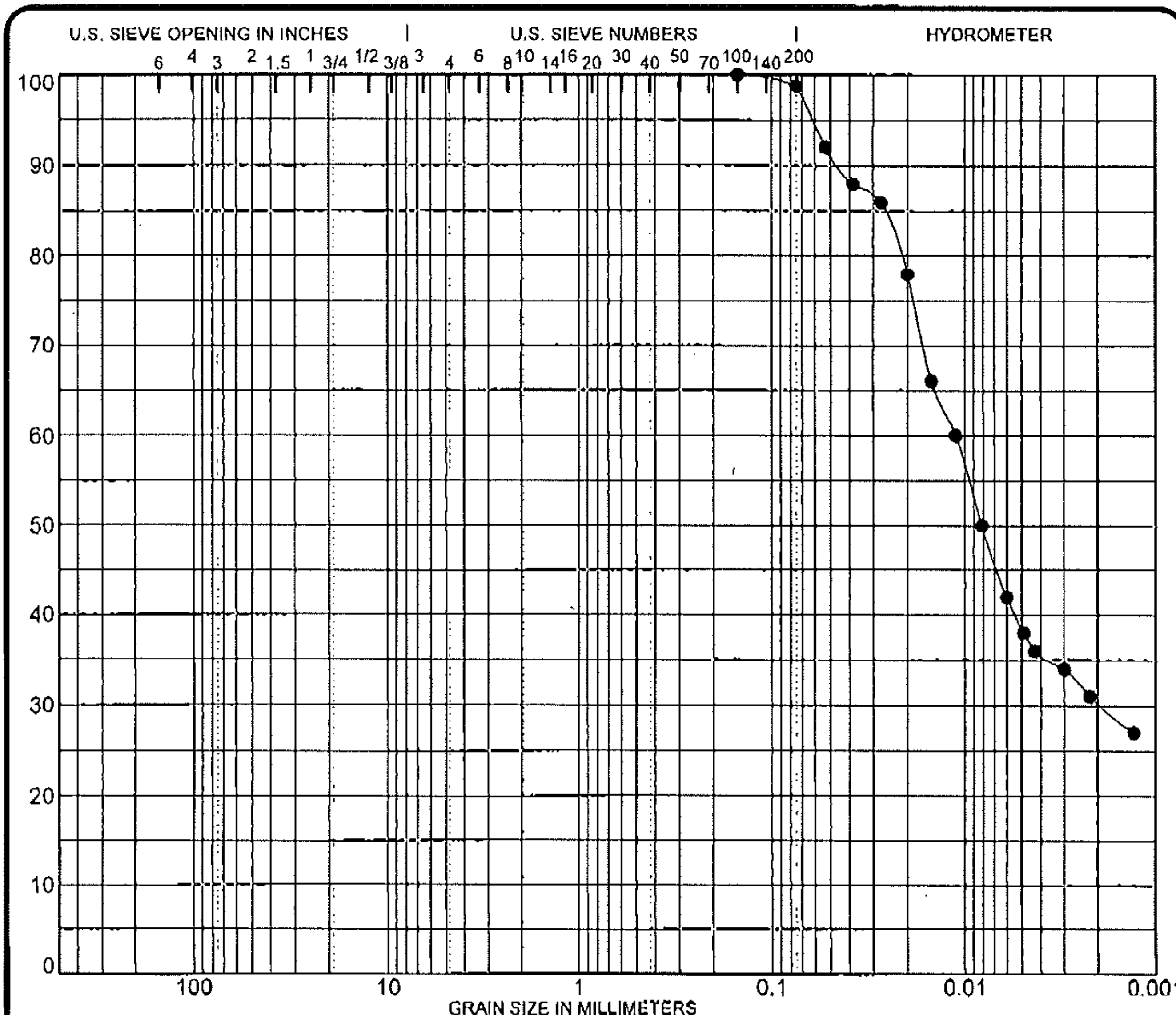
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-1	3 inch	100	Gray clayey SILT, trace sand (ML)			
Sample: 8	2	100				
Depth: 29.0'-30.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	7	89	4
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	58.6	40	37	3
	# 40	99				
	# 100	97				
	# 200	93				

PROJECT Geotechnical Testing
LOCATION ,
SB1

JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-1	3 inch	100	Gray silty CLAY, trace sand (CH)			
Sample: C	2	100				
Depth: 34.0'-35.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	1	69	30
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	31.3	52	17	35
	# 40	100				
	# 100	100				
	# 200	99				

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

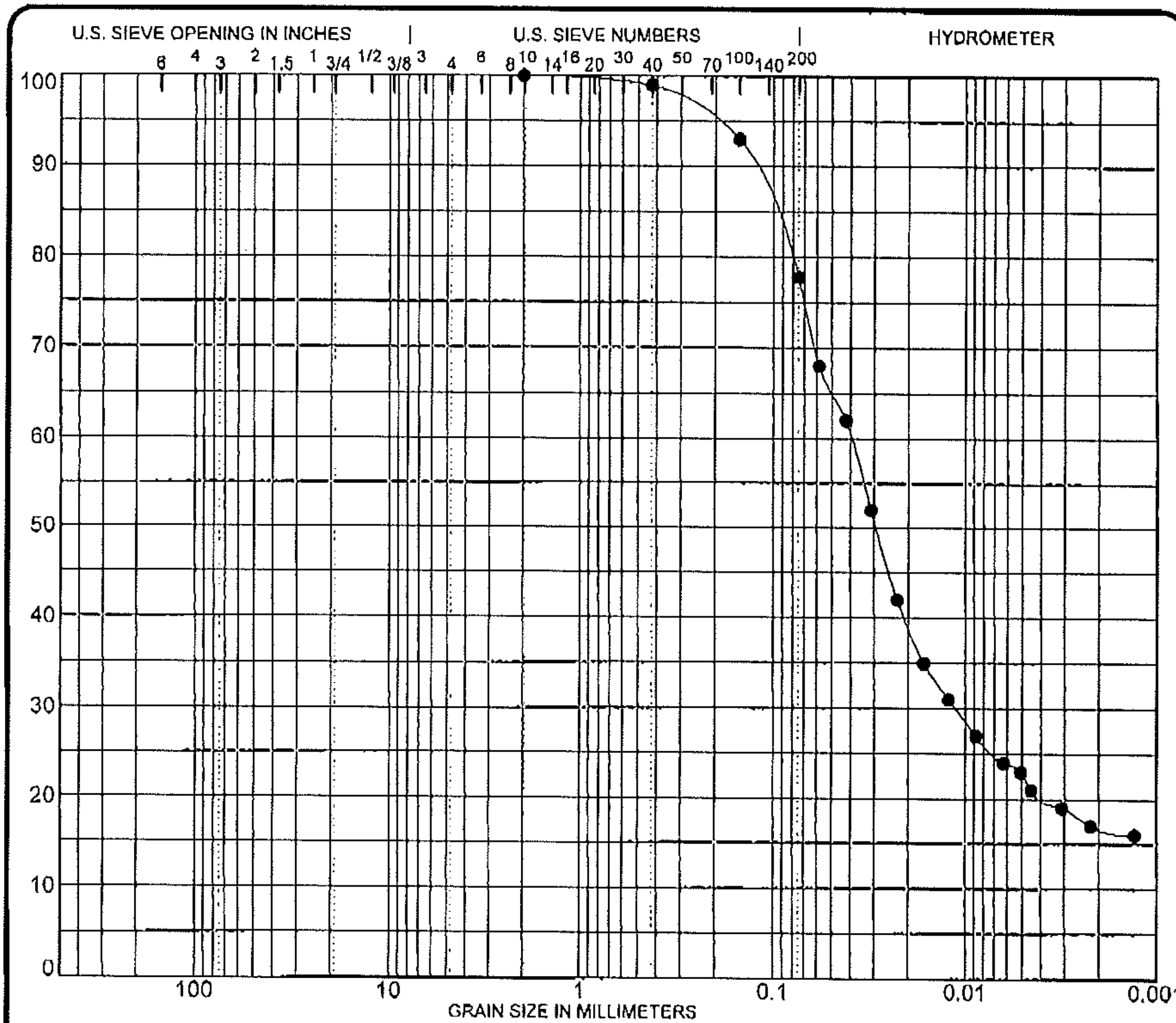
SB1

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11

05/20/2011 11:48 FAX



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-1	3 inch	100	Gray very silty CLAY, some sand (CL)
Sample: D	2	100	
Depth: 36.0'-37.0'	1 1/2	100	
	1	100	%GRAVEL: 0 · %SAND: 22 · %SILT: 61 · %CLAY: 17
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 29.1 · LL: 36 · PL: 16 · PI: 20
	# 10	100	
	# 40	99	
	# 100	93	
	# 200	78	

%GRAVEL	%SAND	%SILT	%CLAY
0	22	61	17

MC%		LL	PL	PI
29.1		36	16	20

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11

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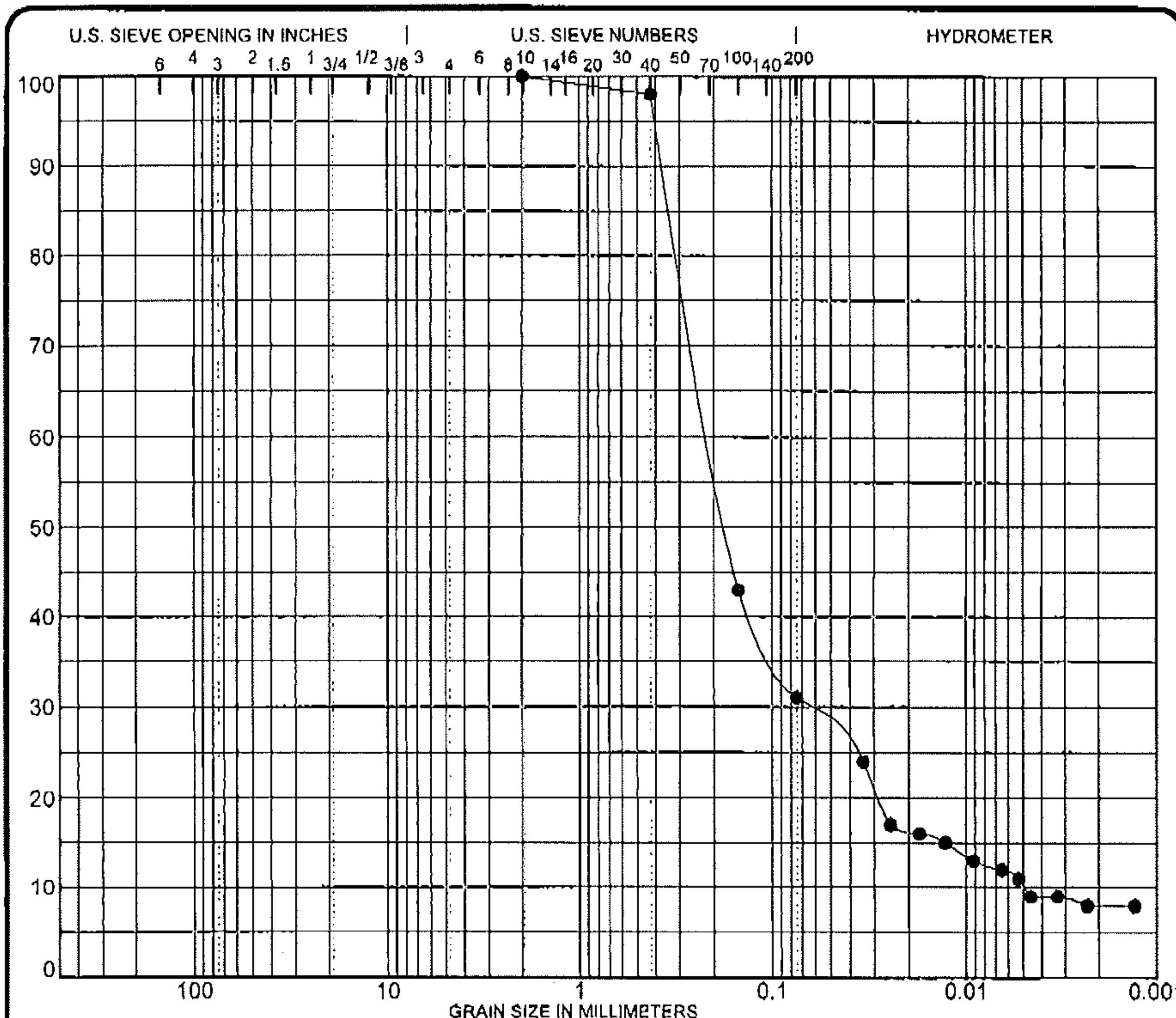


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-1	3 inch	100	Gray clayey SAND (SC)			
Sample: E	2	100				
Depth: 37.0'-38.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	69	23	8
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	30.4	22	14	8
	# 40	98				
	# 100	43				
	# 200	31				

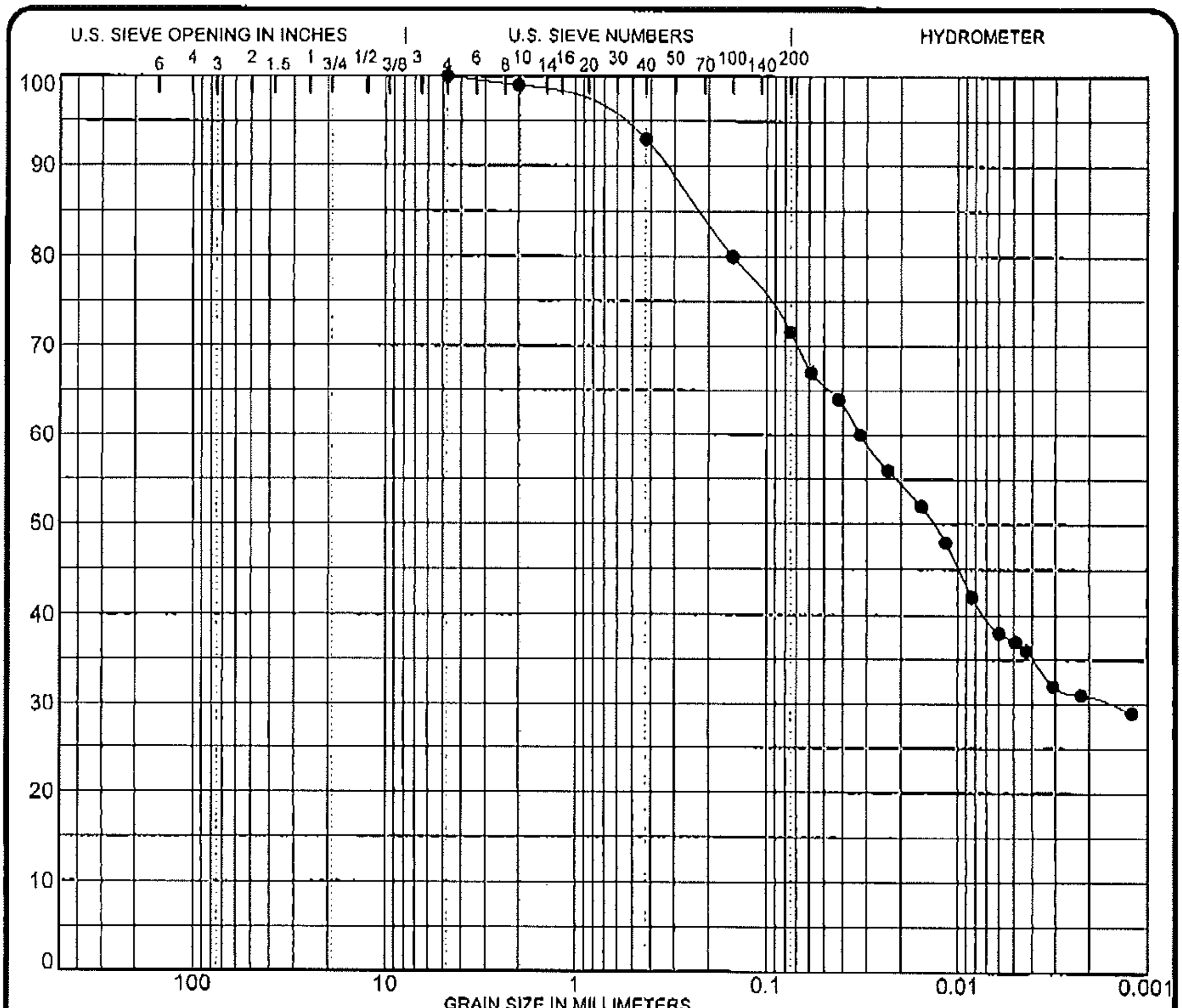
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-2	3 inch	100	Brownish gray silty CLAY, some sand			
Sample: A	2	100	(CL)			
Depth: 8.0'-9.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	28	41	31
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	99	15.7	46	12	34
	# 40	93				
	# 100	80				
	# 200	72				

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L-76,757
DATE May 20, 2011

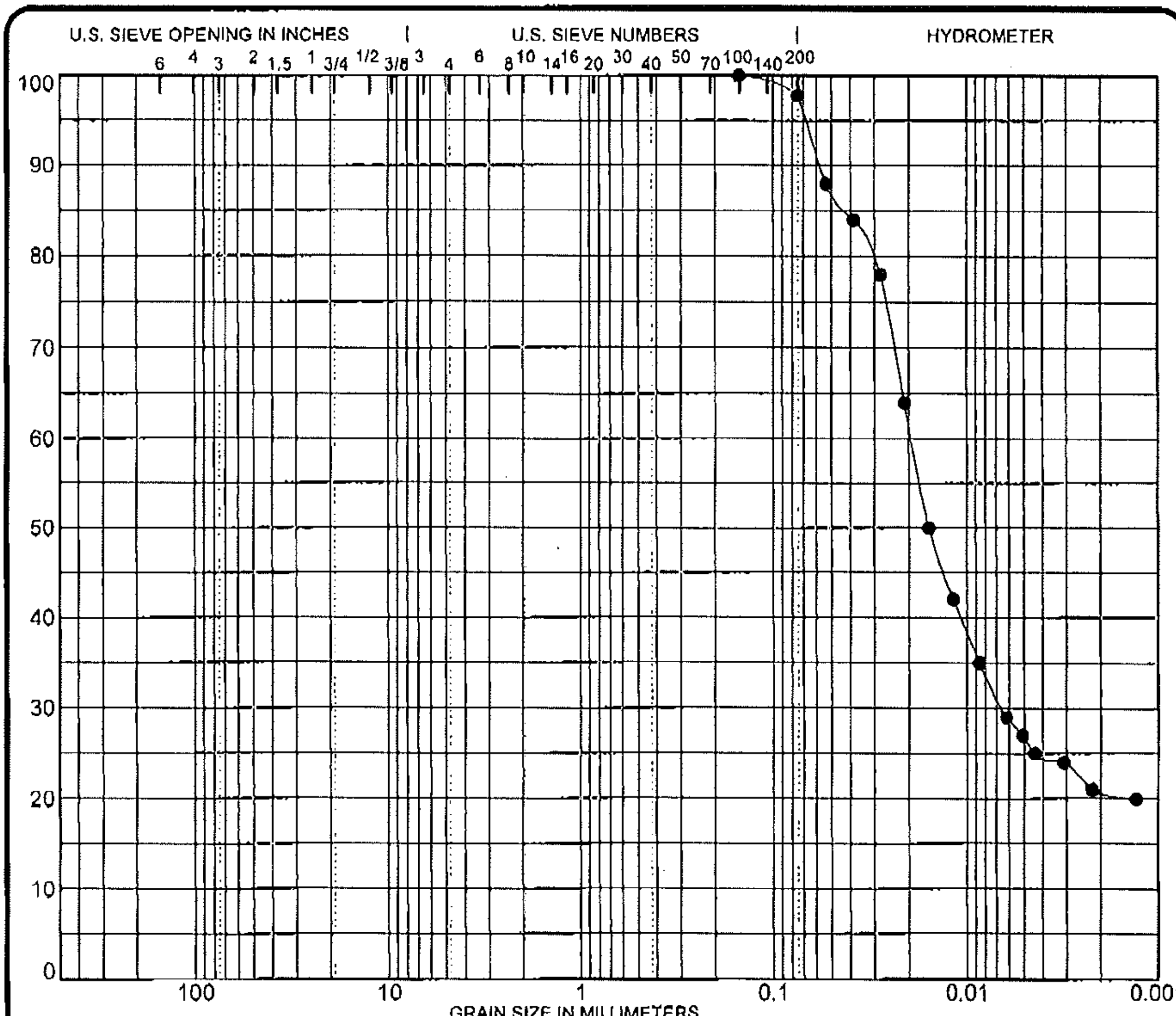
SB2

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11

06/20/2011 11:48 FAX 008



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-2	3 inch	100	Dark gray very silty CLAY, trace sand			
Sample: B	2	100	(CL)			
Depth: 28.0'-29.0	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	2	77	21
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	35.1	42	18	24
	# 40	100				
	# 100	100				
	# 200	98				

PROJECT Geotechnical Testing
LOCATION ,

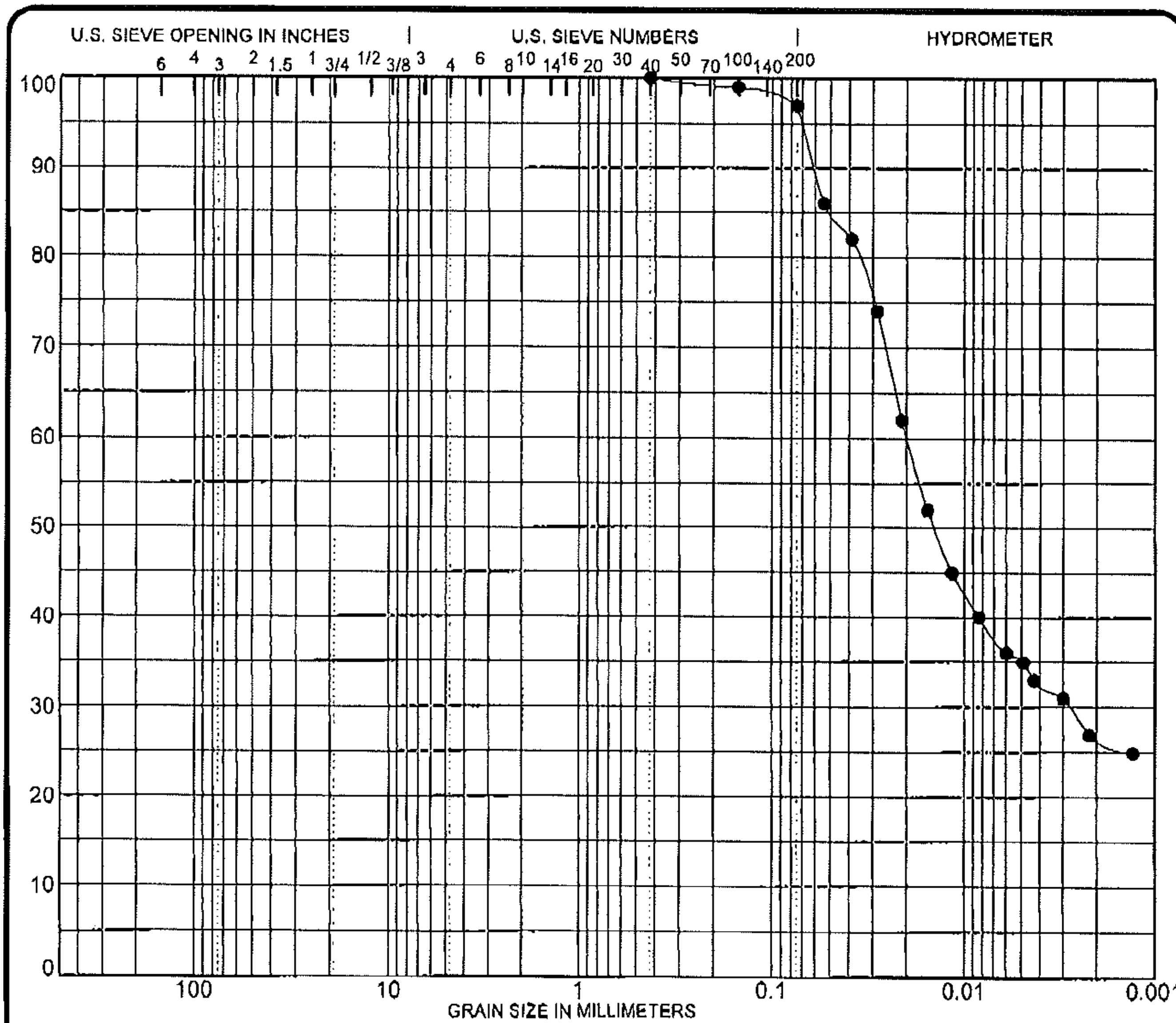
JOB NO. L - 76,757
DATE May 20, 2011

SB2

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-2	3 inch	100	Dark gray silty CLAY, trace sand (CH)			
Sample: C	2	100				
Depth: 32.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	3	70	27
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	32.9	51	16	35
	# 40	100				
	# 100	99				
	# 200	97				

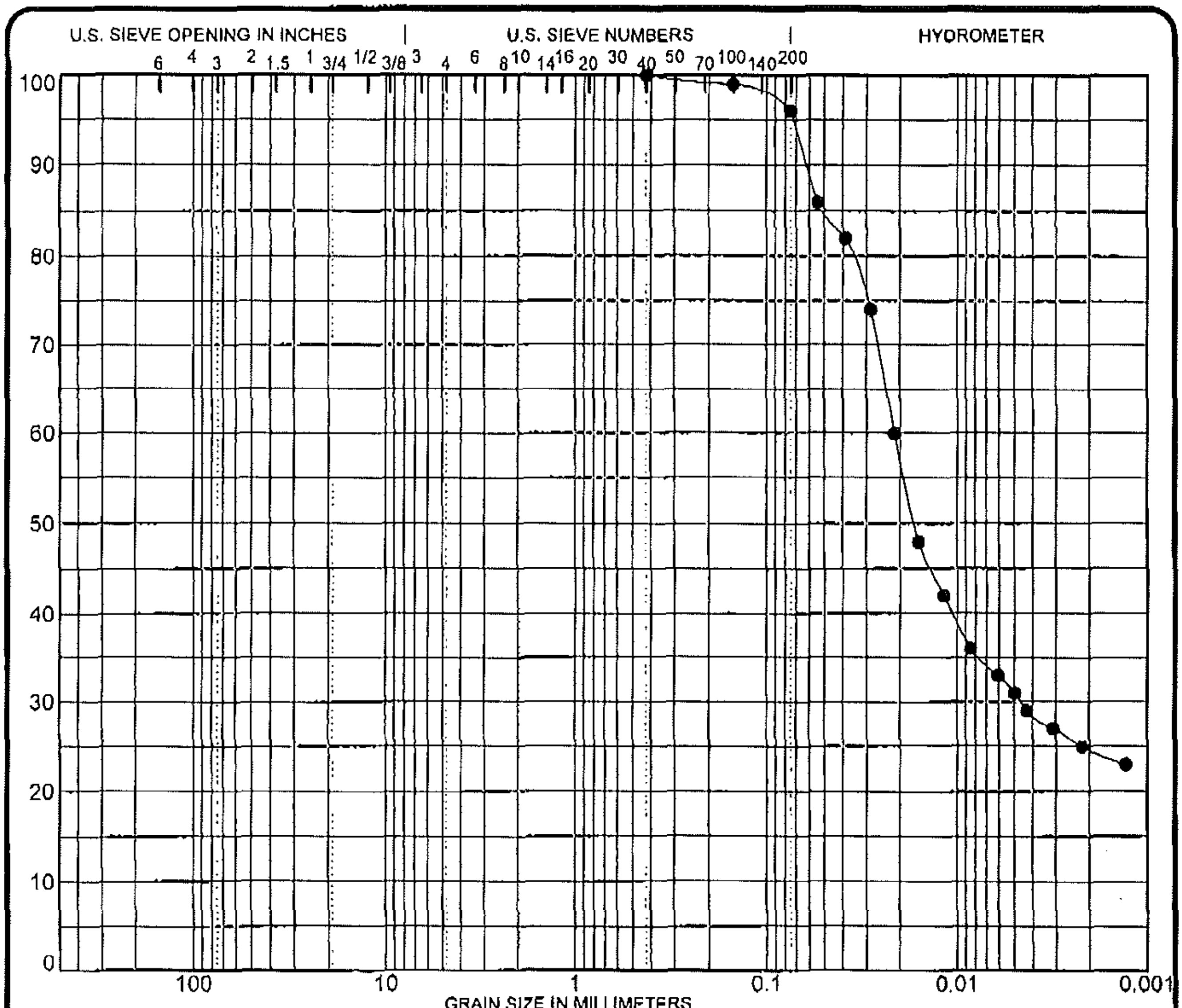
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB2

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-3	3 inch	100
Sample: A	2	100
Depth: 38.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	100
	# 100	99
	# 200	96

SOIL CLASSIFICATION

Dark gray very silty CLAY, trace sand

(CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	4	71	25

MC%		LL	PL	PI
34.4		46	15	31

PROJECT Geotechnical Testing
LOCATION ,
SB3

JOB NO. L - 76,757
DATE May 20, 2011

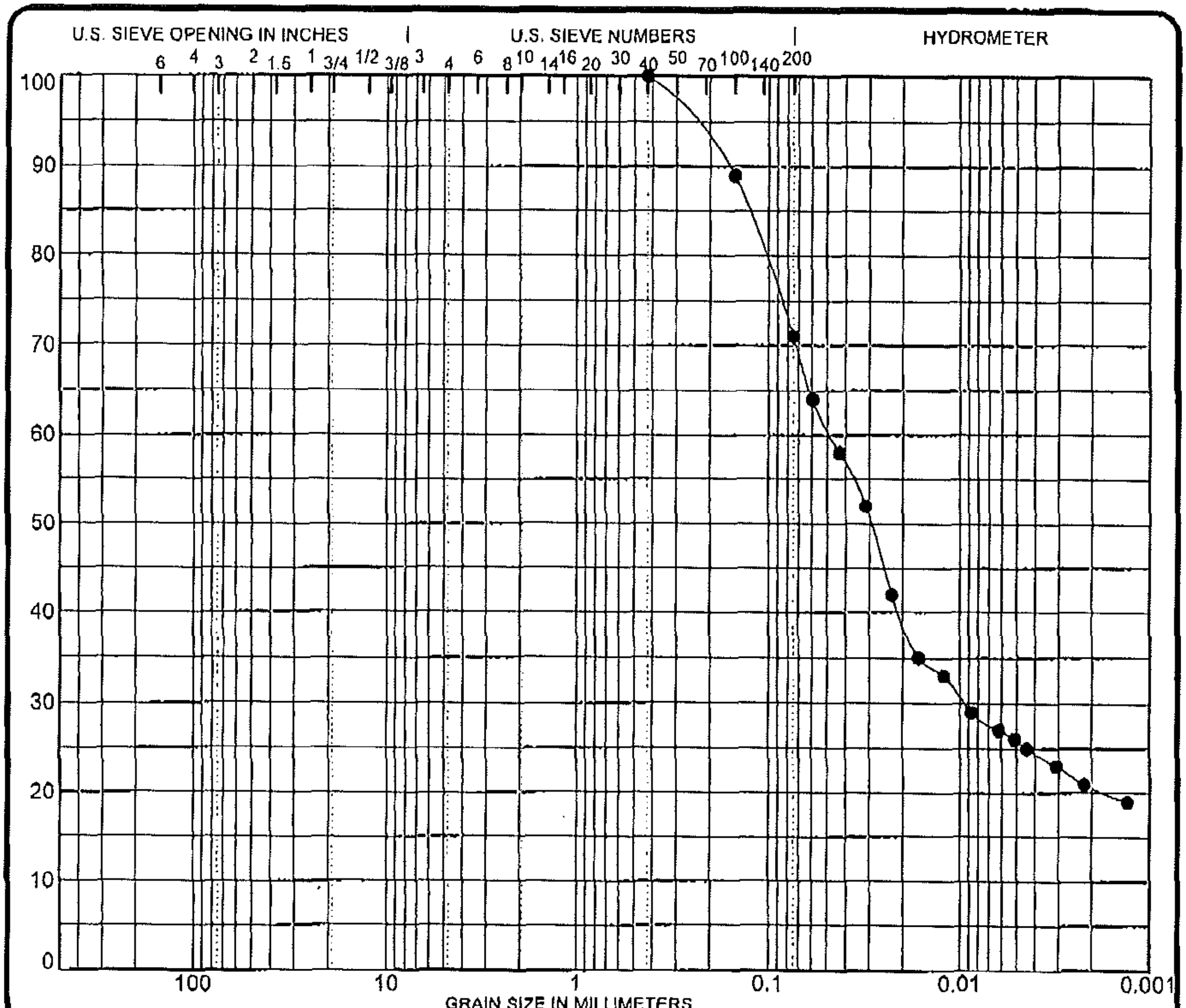
SOIL DATA SHEET

Testing Service Corporation

Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11

05/20/2011 11:49 FAX



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-4	3 inch	100	Dark gray silty CLAY, some sand (CL)			
Sample: A	2	100				
Depth: 34.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	29	50	21
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	24.1	41	12	29
	# 40	100				
	# 100	89				
	# 200	71				

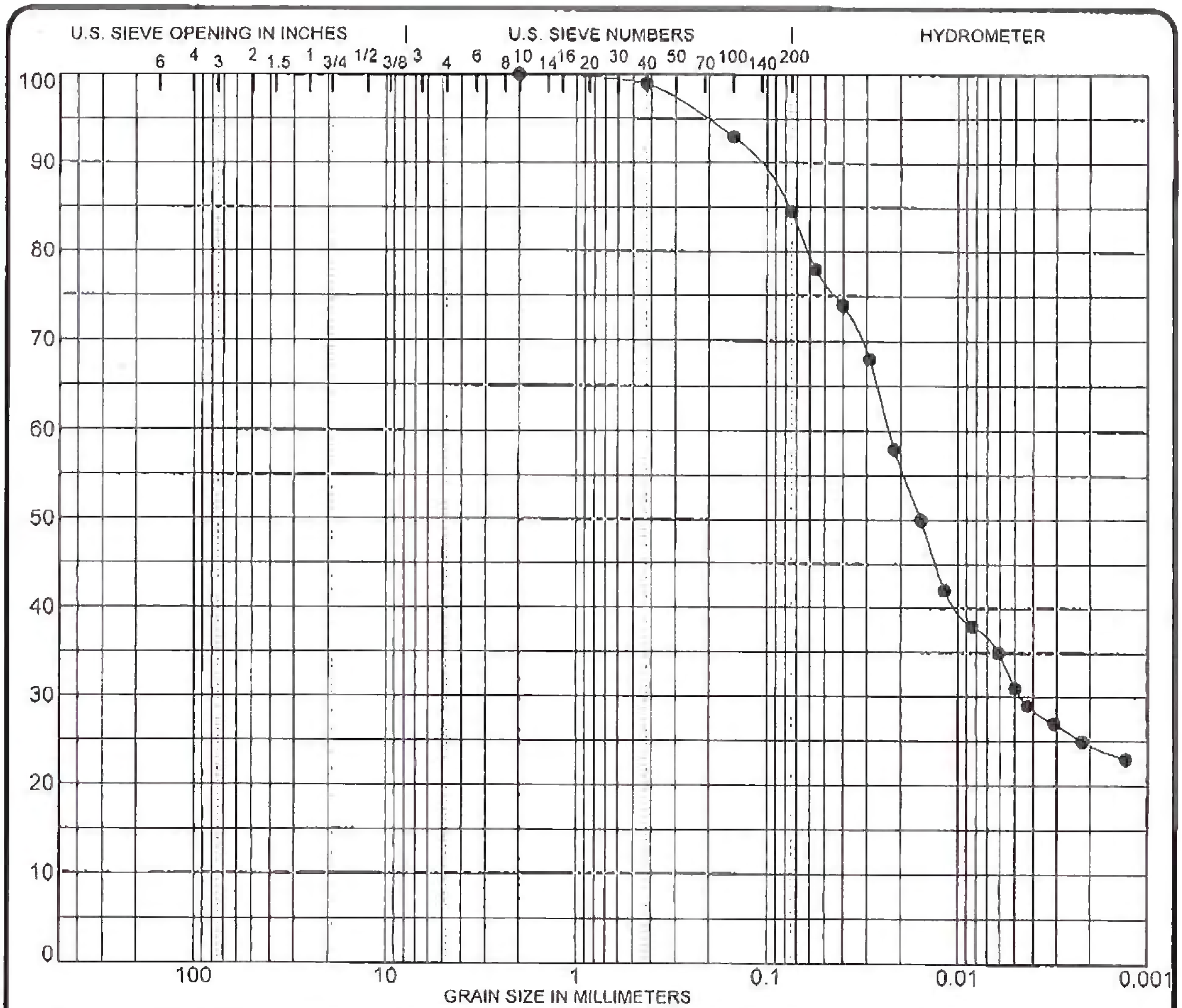
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB4

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-5	3 inch	100	Gray very silty CLAY, little sand (CL)			
Sample: A	2	100				
Depth: 34.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	15	60	25
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	23.3	43	16	27
	# 40	99				
	# 100	93				
	# 200	85				

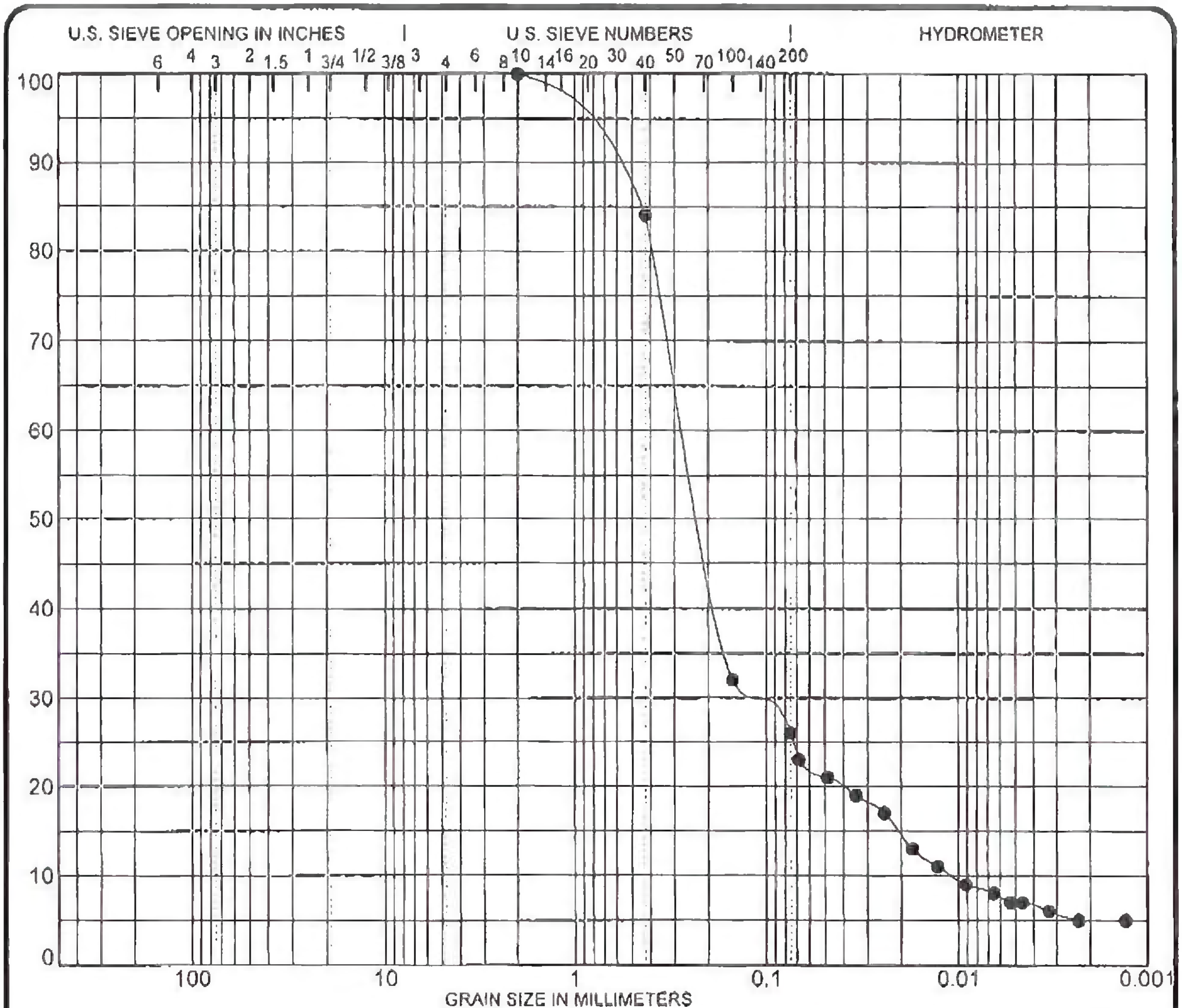
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB5

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC AL1.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-6	3 inch	100	Gray clayey SAND (SC)			
Sample: A	2	100				
Depth: 16.0'-17.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	74	21	5
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	24.6	16	13	3
	# 40	84				
	# 100	32				
	# 200	26				

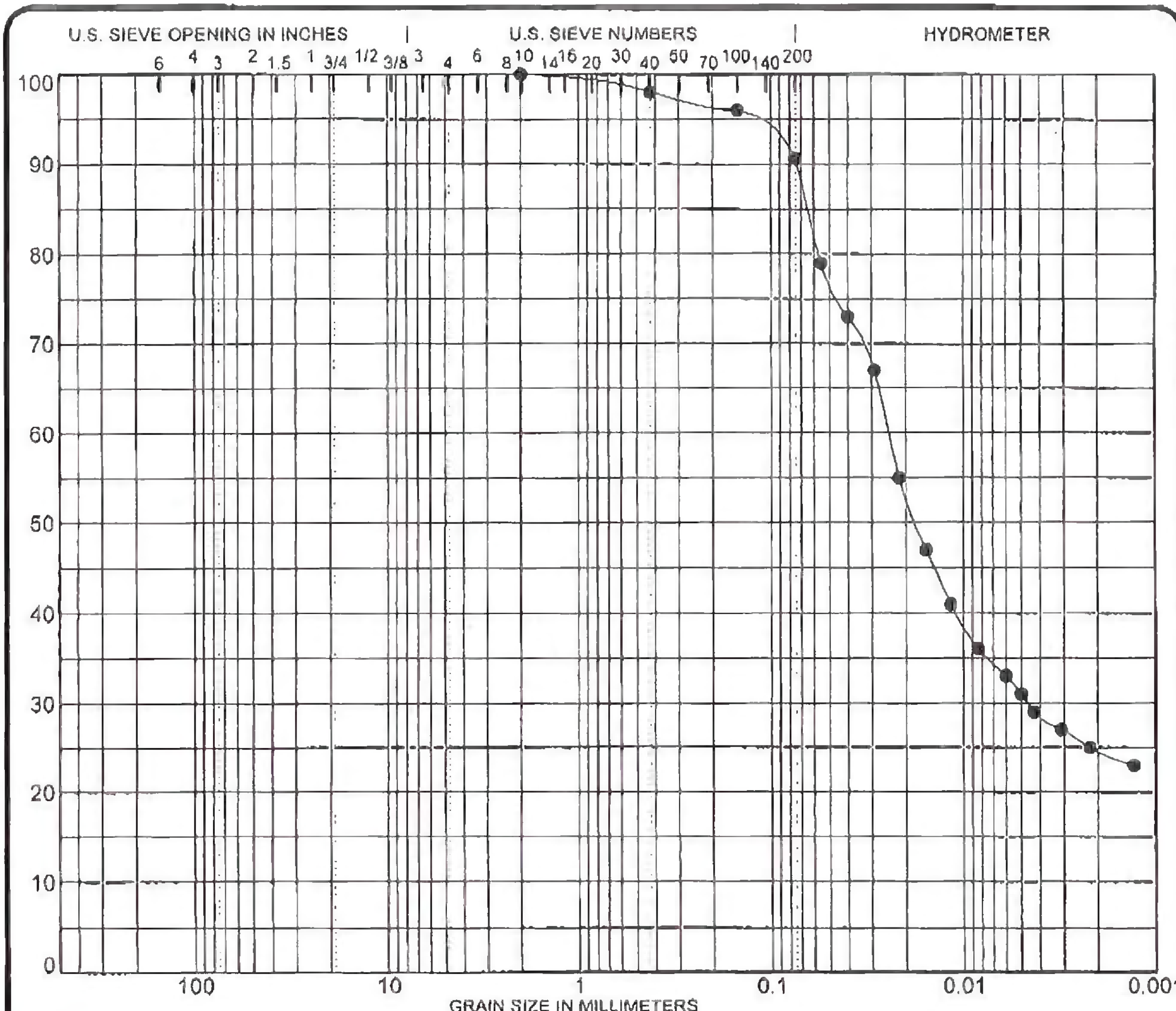
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB6

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

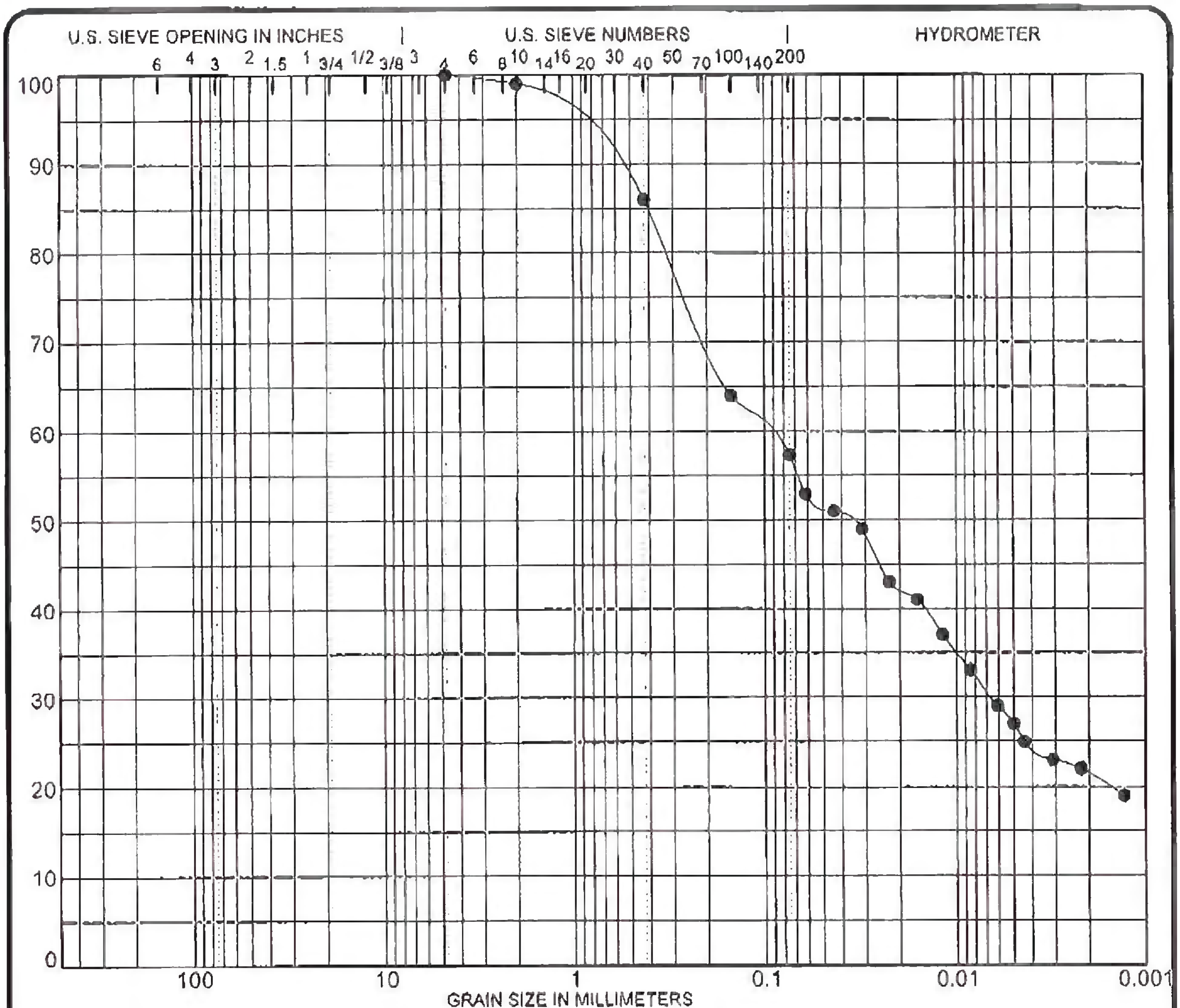
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-6	3 inch	100	Brownish gray very silty CLAY, trace sand			
Sample: B	2	100	(CL)			
Depth: 28.0'-29.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	9	66	25
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	28.3	43	13	30
	# 40	98				
	# 100	96				
	# 200	91				

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB6

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION
Boring: SB-8
Sample: A
Depth: 10.0'
NOTES:

SIEVE	% PASS
3 inch	100
2	100
1 1/2	100
1	100
3/4	100
3/8	100
# 4	100
# 10	99
# 40	86
# 100	64
# 200	57

SOIL CLASSIFICATION

Gray sandy CLAY (CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	43	36	21

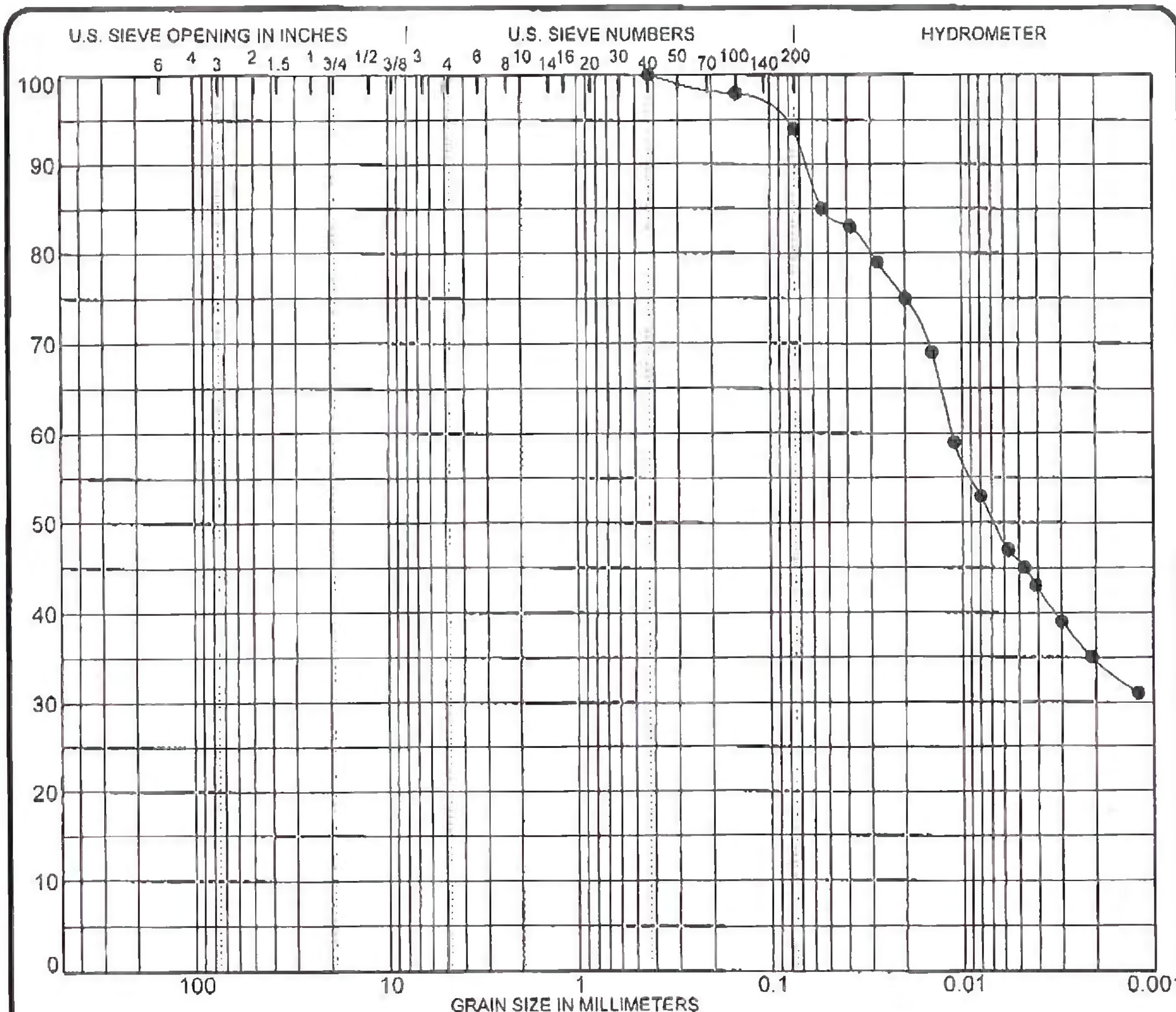
MC%		LL	PL	PI
21.6		36	12	24

PROJECT Geotechnical Testing
LOCATION ,
SB8

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION				
Boring: SB-8	3 inch	100	Gray very silty CLAY, trace sand (CL)				
Sample: B	2	100					
Depth: 20.0'	1 1/2	100					
	1	100	%GRAVEL	%SAND		%SILT	%CLAY
NOTES:	3/4	100	0	6		59	35
	3/8	100					
	# 4	100	MC%		LL	PL	PI
	# 10	100	31.1		56	19	37
	# 40	100					
	# 100	98					
	# 200	94					

PROJECT Geotechnical Testing
LOCATION ,

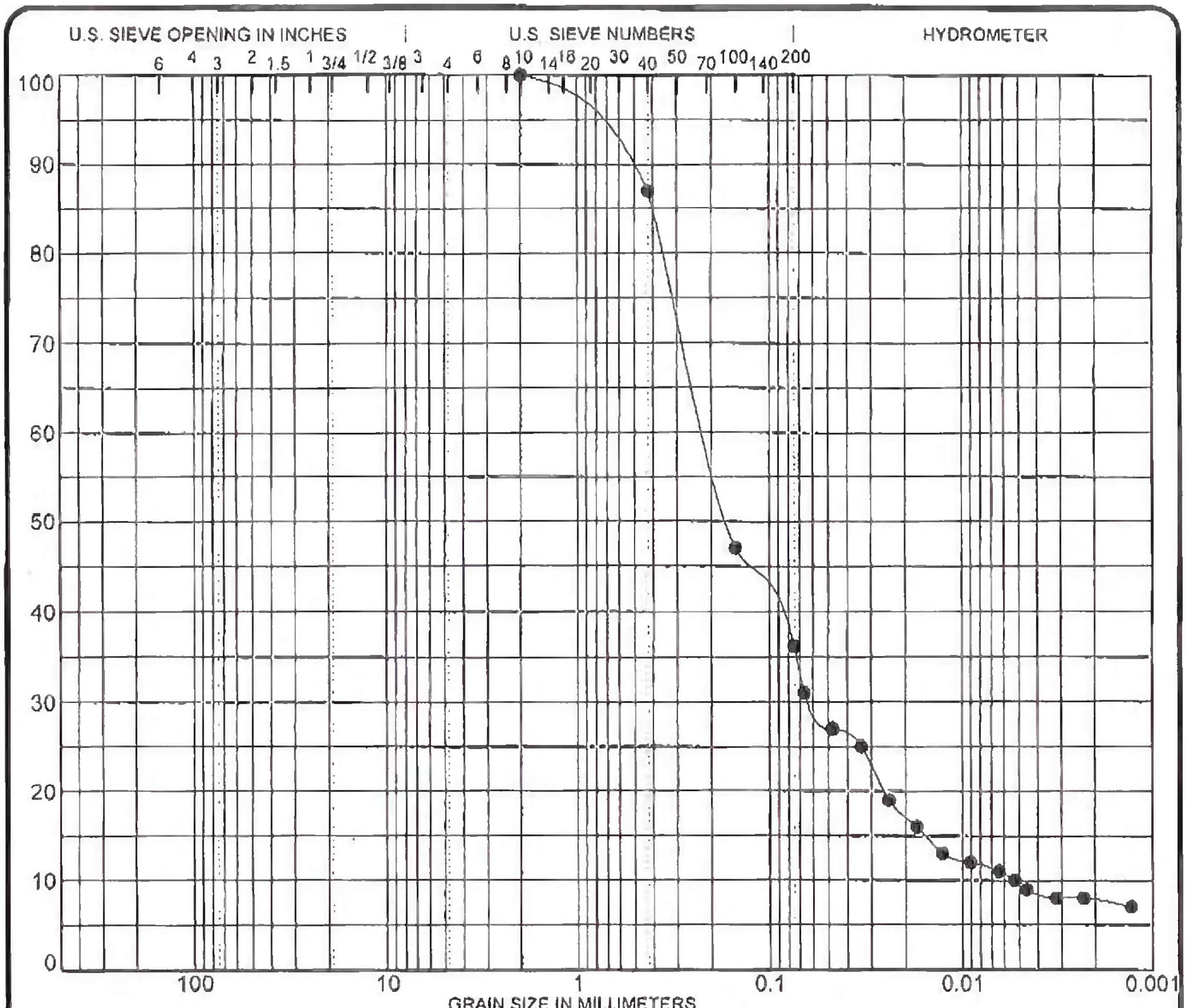
JOB NO. L - 76,757
DATE May 23, 2011

SB8

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-8	3 inch	100	Gray clayey SAND (SC)			
Sample: C	2	100				
Depth: 22.0'	1 1/2"	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	64	28	8
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	26.9	21	13	8
	# 40	87				
	# 100	47				
	# 200	36				

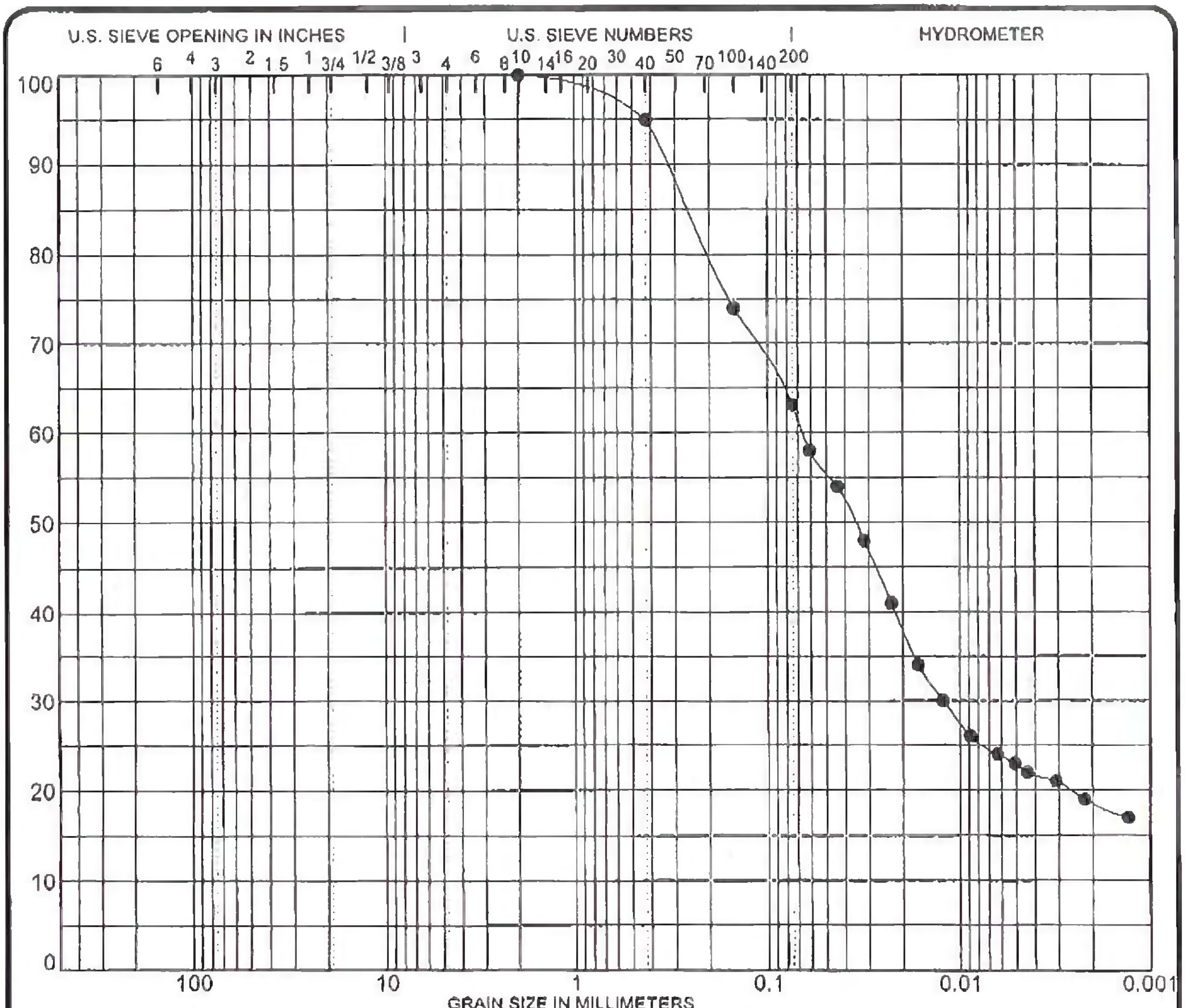
PROJECT Geotechnical Testing
LOCATION ,
SB8

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-9	3 inch	100	Brownish gray sandy CLAY (CL)			
Sample: A	2	100				
Depth: 18.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	37	44	19
	3/8	100				
	# 4	100	MC%	LL	PL	PI
	# 10	100	34.0	35	13	22
	# 40	95				
	# 100	74				
	# 200	63				

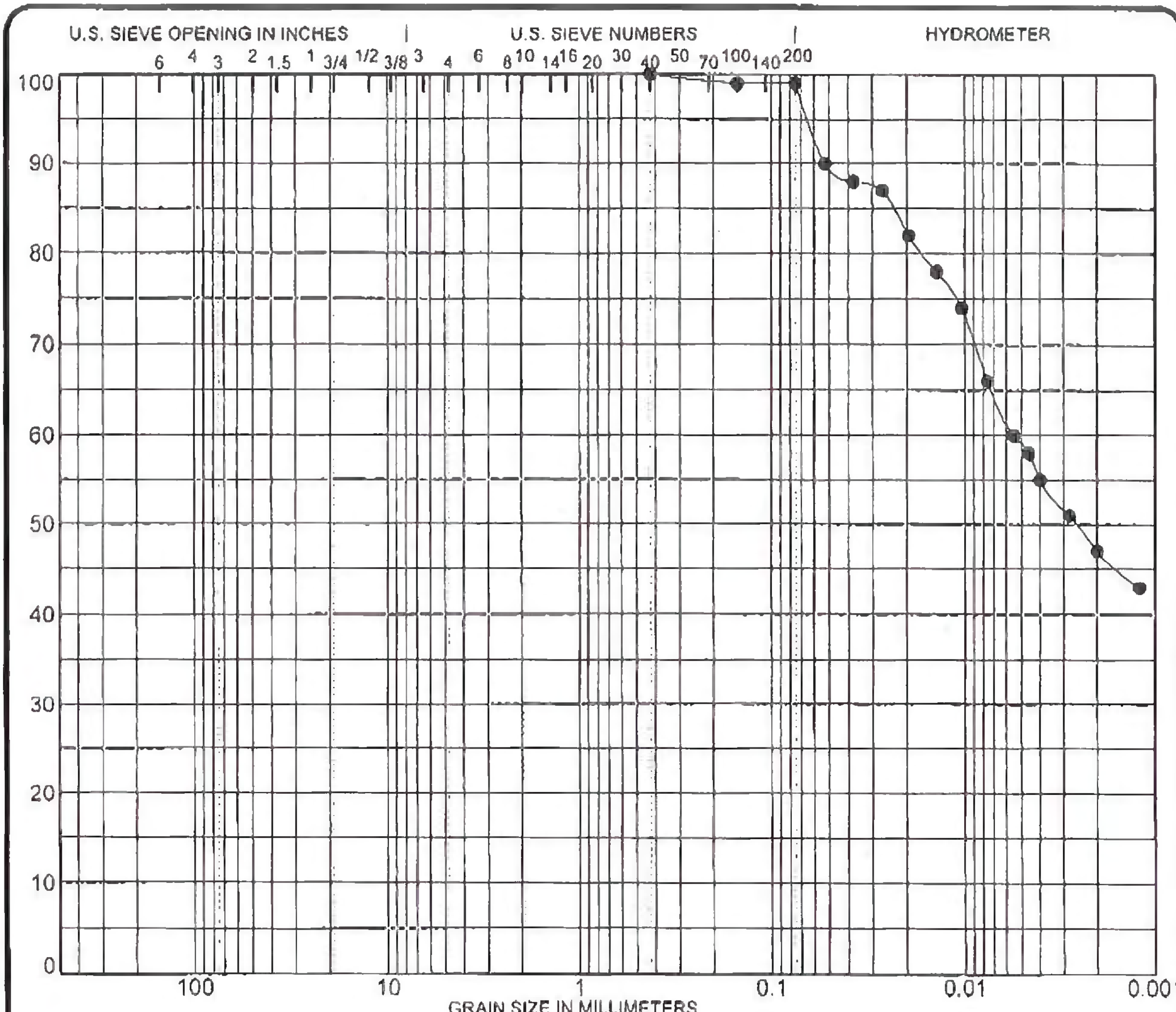
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB9

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-10	3 inch	100	Brownish gray silty CLAY, trace sand			
Sample: A	2	100	(CH)			
Depth: 20.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	1	52	47
	3/8	100				
	# 4	100	MC%		LL / PL	PI
	# 10	100	26.9		74 / 15	59
	# 40	100				
	# 100	99				
	# 200	99				

PROJECT Geotechnical Testing
LOCATION ,

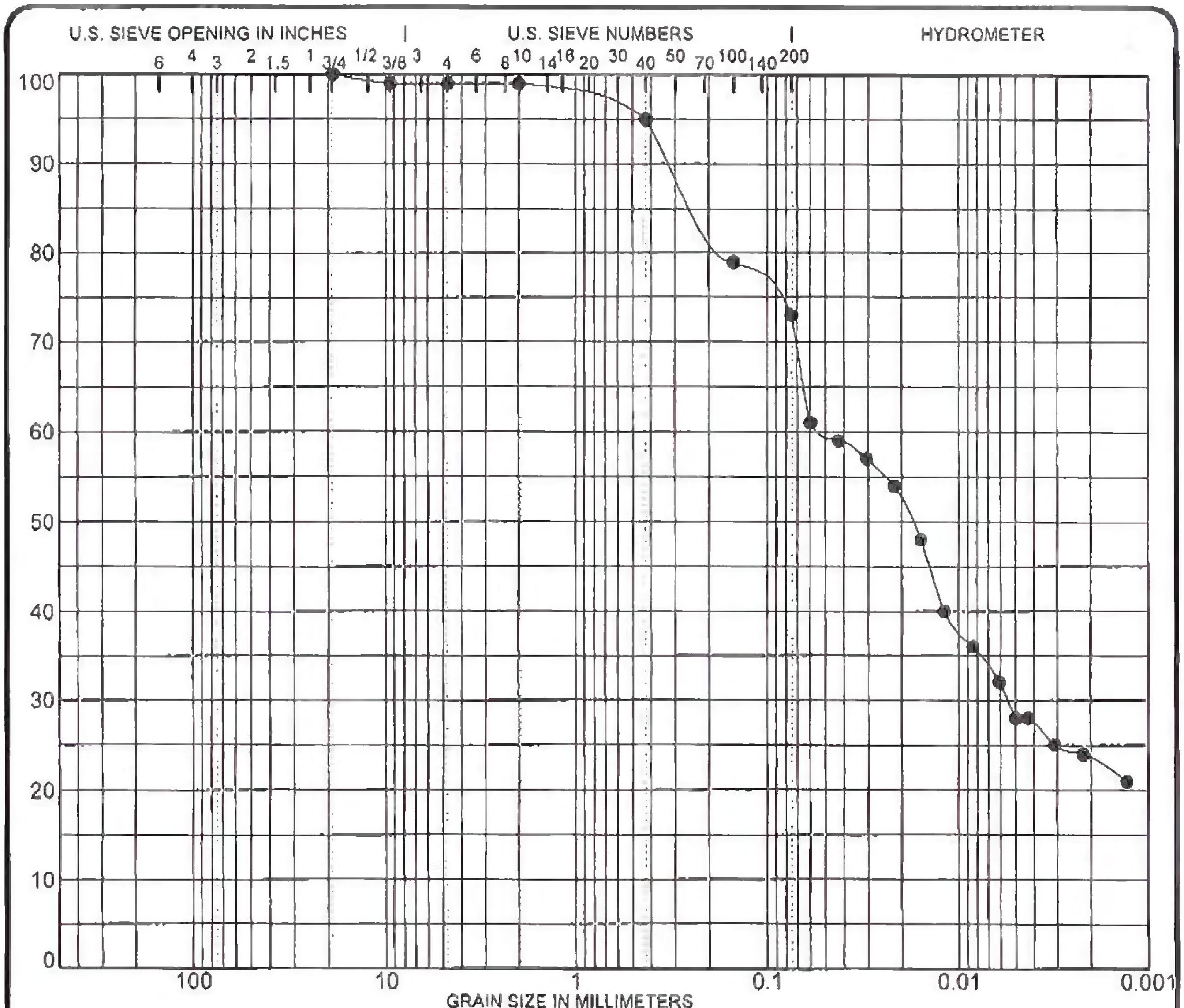
JOB NO. L - 76,757
DATE May 23, 2011

SB10

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: SB-12	3 inch	100	Gray silty CLAY, some sand, trace gravel			
Sample: A	2	100	(CL)			
Depth: 23.0'-24.0'	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	1	26	50	23
	3/8	99				
	# 4	99	MC%	LL	PL	PI
	# 10	99	35.9	42	16	26
	# 40	95				
	# 100	79				
	# 200	73				

PROJECT Geotechnical Testing
LOCATION ,

JOB NO. L - 76,757
DATE May 23, 2011

SB12

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

Attachment D

Static Slope Stability Analyses

Ten Most Critical Surfaces Per Analysis

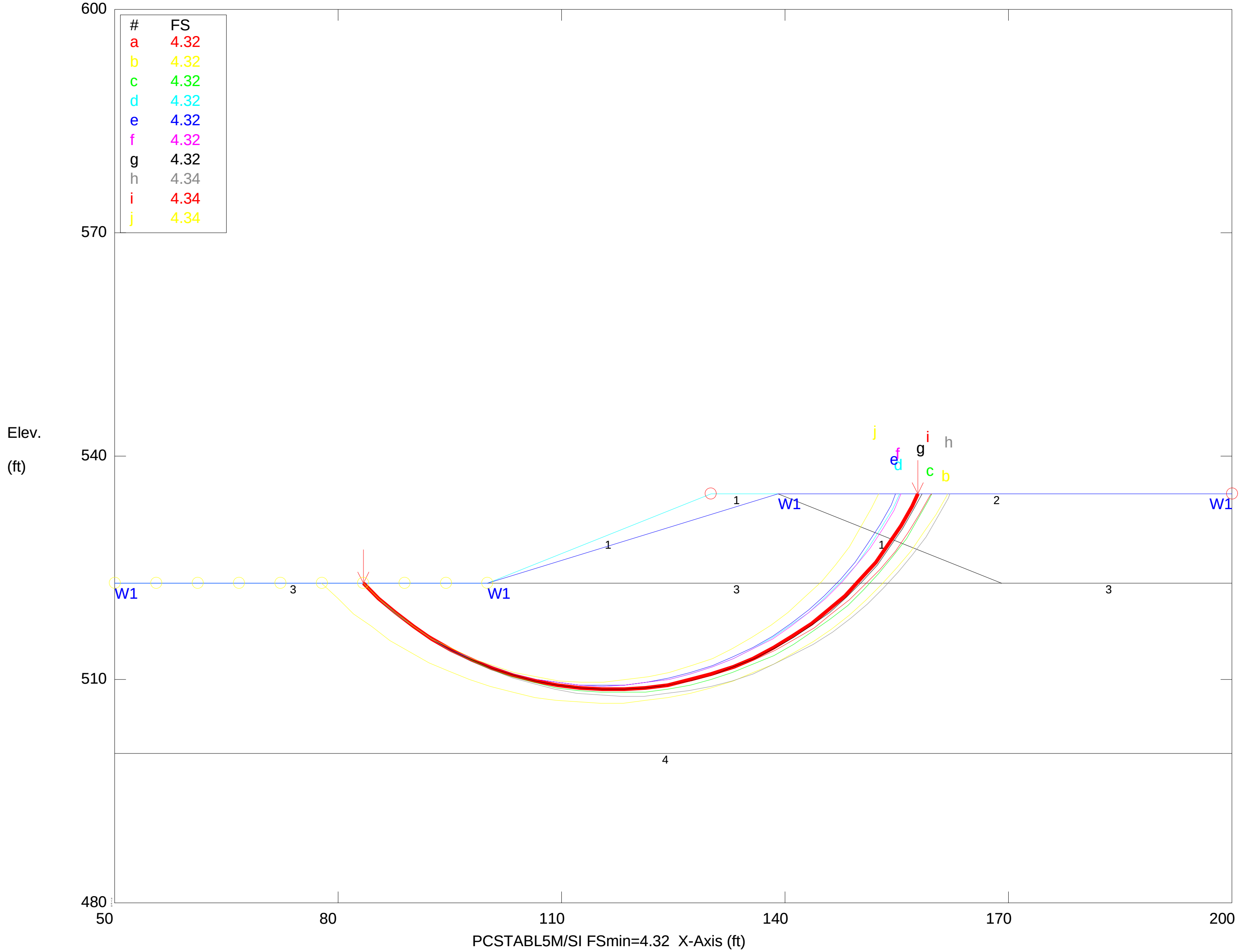
Burlington Generating Station

Source:

Program pcSTABL5m/SI output by Aether dbs May 2011

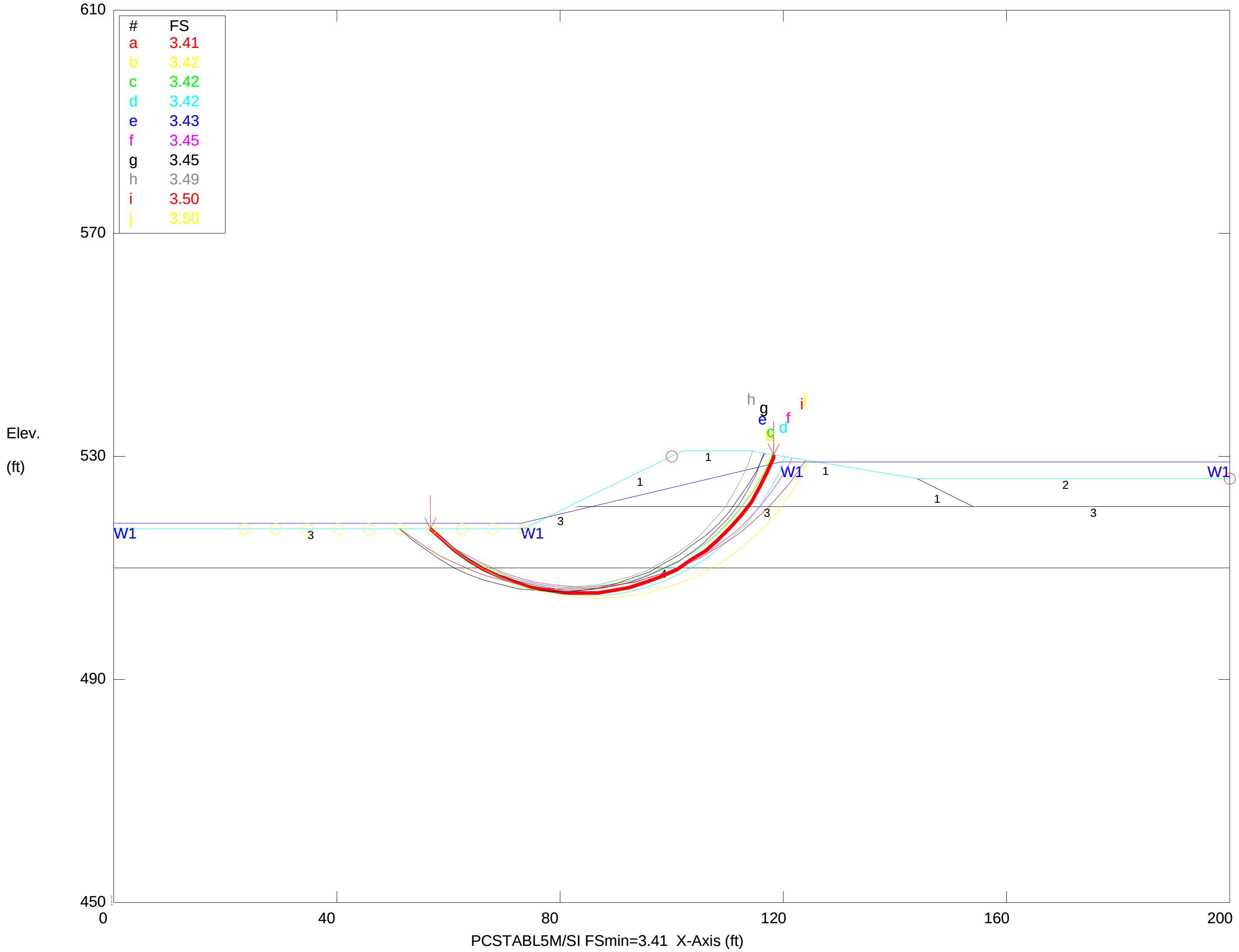
Alliant Burlington Main Ash Pond South Dike - Static Case

Ten Most Critical. C:BURL20C2.PLT By: TCW 05-31-11 7:47am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	700	0	0	0	W1
2	Ash	120	120	0	25	0	0	W1
3	Natural	120	120	1200	0	0	0	W1
4	Sand	130	130	0	37	0	0	W1

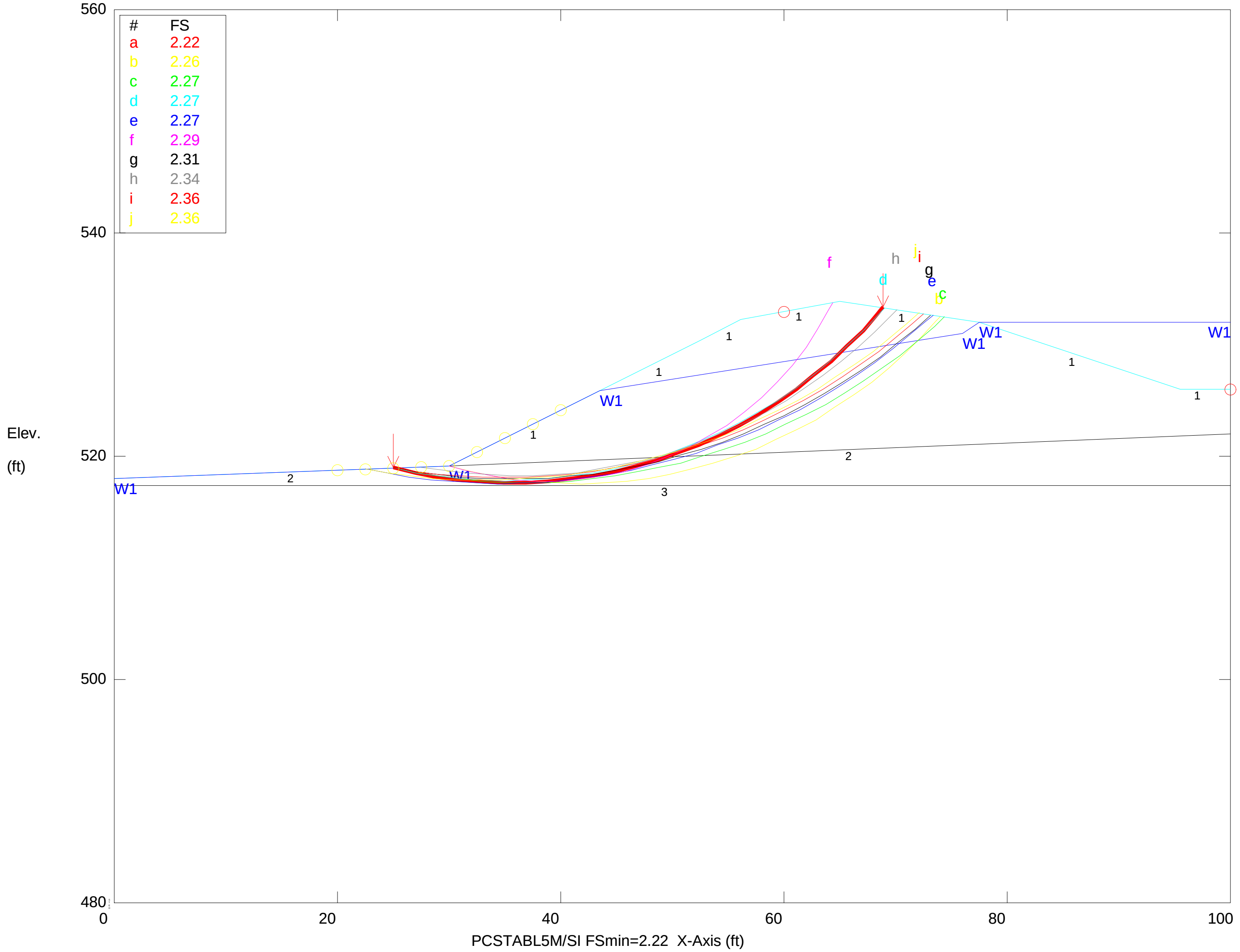
Alliant Burlington Upper Ash Pond North Dike Slope - Static Case
Ten Most Critical. E:BURL40C3.PLT By: TCW 05-29-11 1:07pm



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Dike	130	130	1950	0	0	0	W1
2 Ash	120	120	0	25	0	0	W1
3 Clay	125	125	900	0	0	0	W1
4 Sand	125	125	0	35	0	0	W1

Alliant Burlington Ash Seal Pond South Dike - Static Case

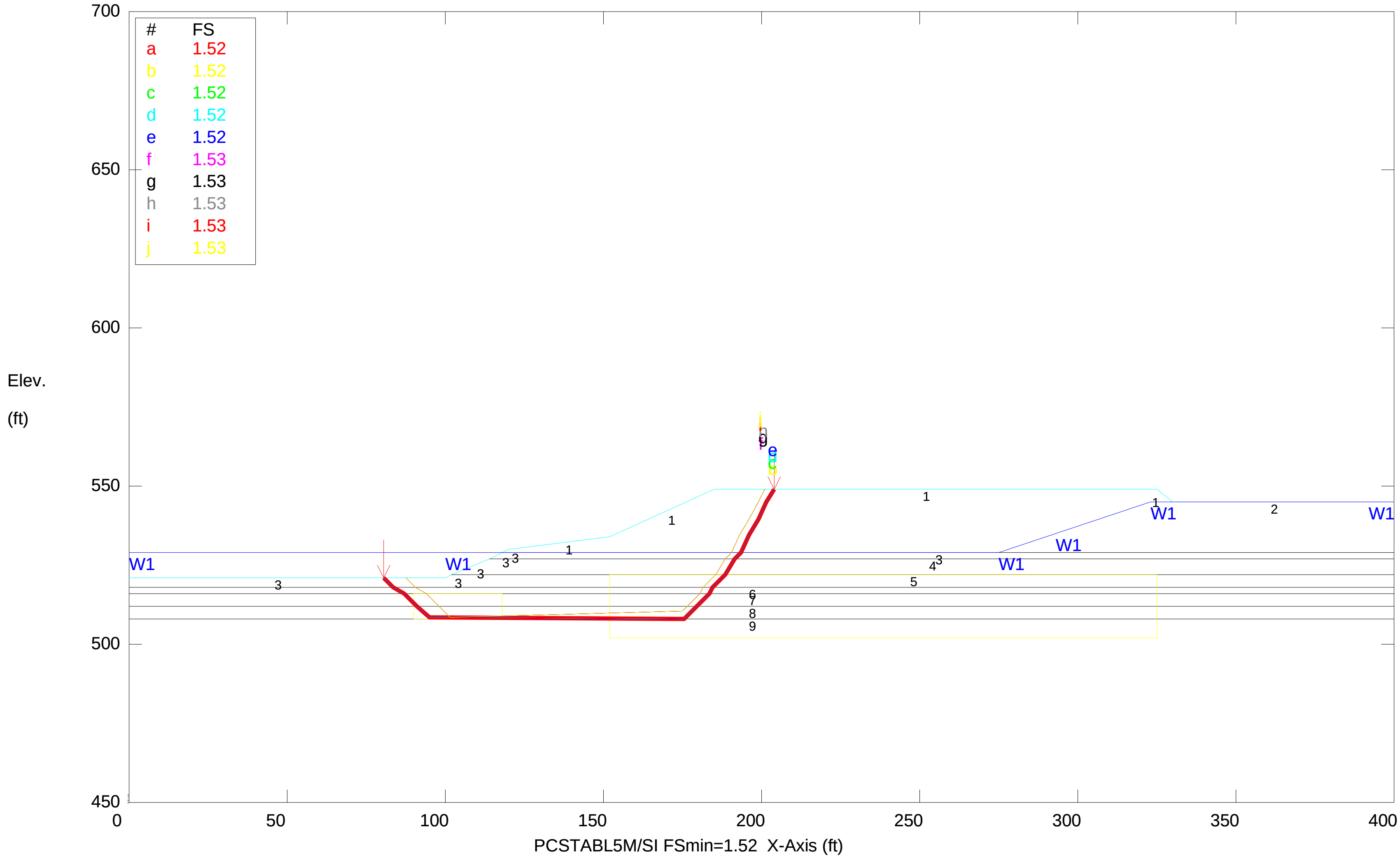
Ten Most Critical. E:BURL50C2.PLT By: TCW 05-29-11 3:55pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Clay	120	120	700	0	0	0	W1
2	Sand	130	130	0	37	0	0	W1
3	Clay	125	125	900	0	0	0	W1

Alliant Burlington Economizer Pile East, North Ash Slope - Static Case

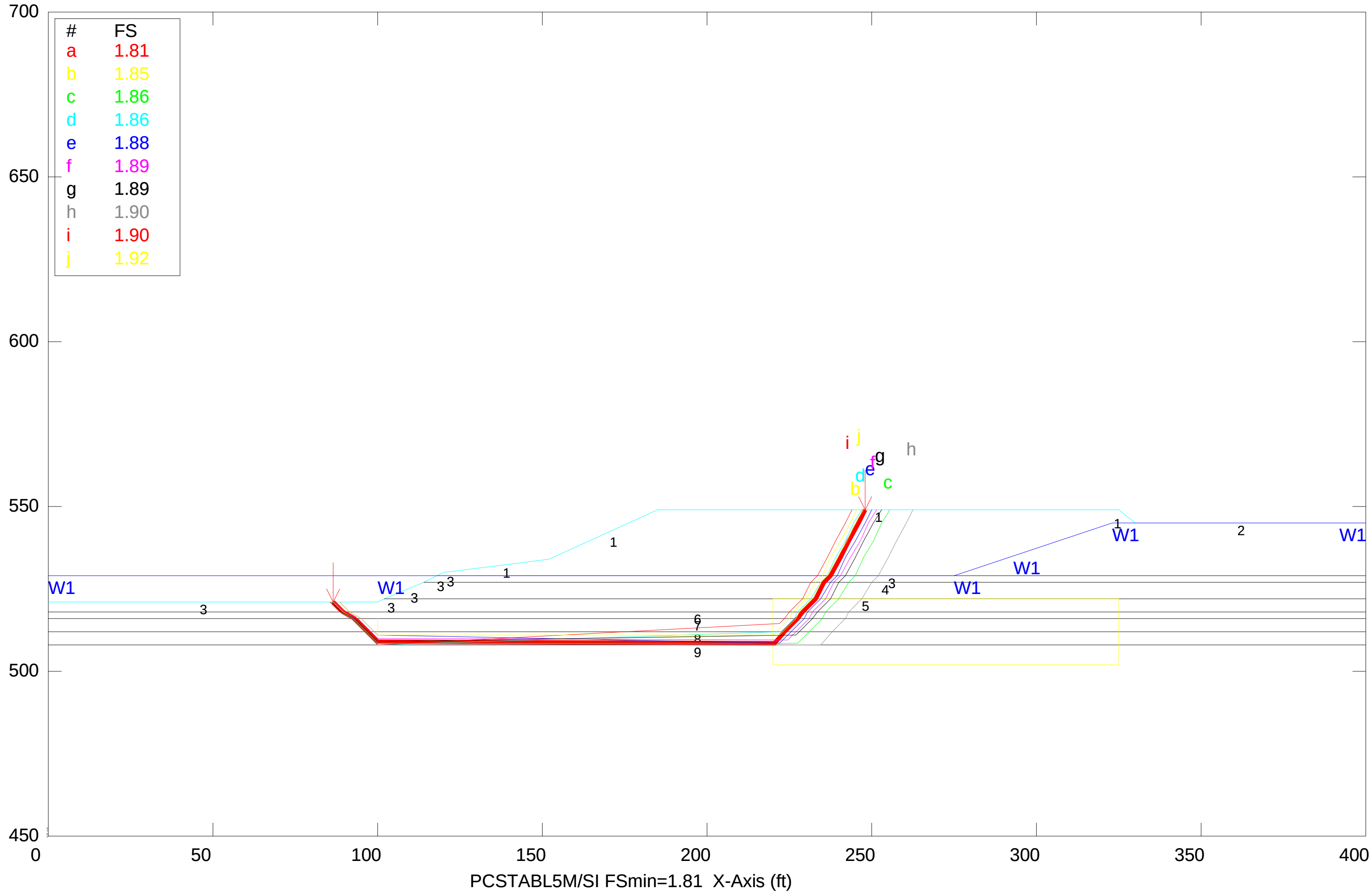
Ten Most Critical. C:BURL60B.PLT By: TCW 05-27-11 10:53am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	DIKE	125	125	0	34	0	0	W1
2	ASH	120	120	0	34	0	0	W1
3	CLAY	125	125	1000	0	0	0	W1
4	ASH	120	120	0	32	0	0	W1
5	CLAY	125	125	1000	0	0	0	W1
6	ASH	120	120	0	32	0	0	W1
7	CLAY	125	125	600	0	0	0	W1
8	CLAY	125	125	600	0	0	0	W1
9	SAND	125	125	0	30	0	0	W1

Alliant Burlington Economizer Pile East, North Ash Slope - Static Case

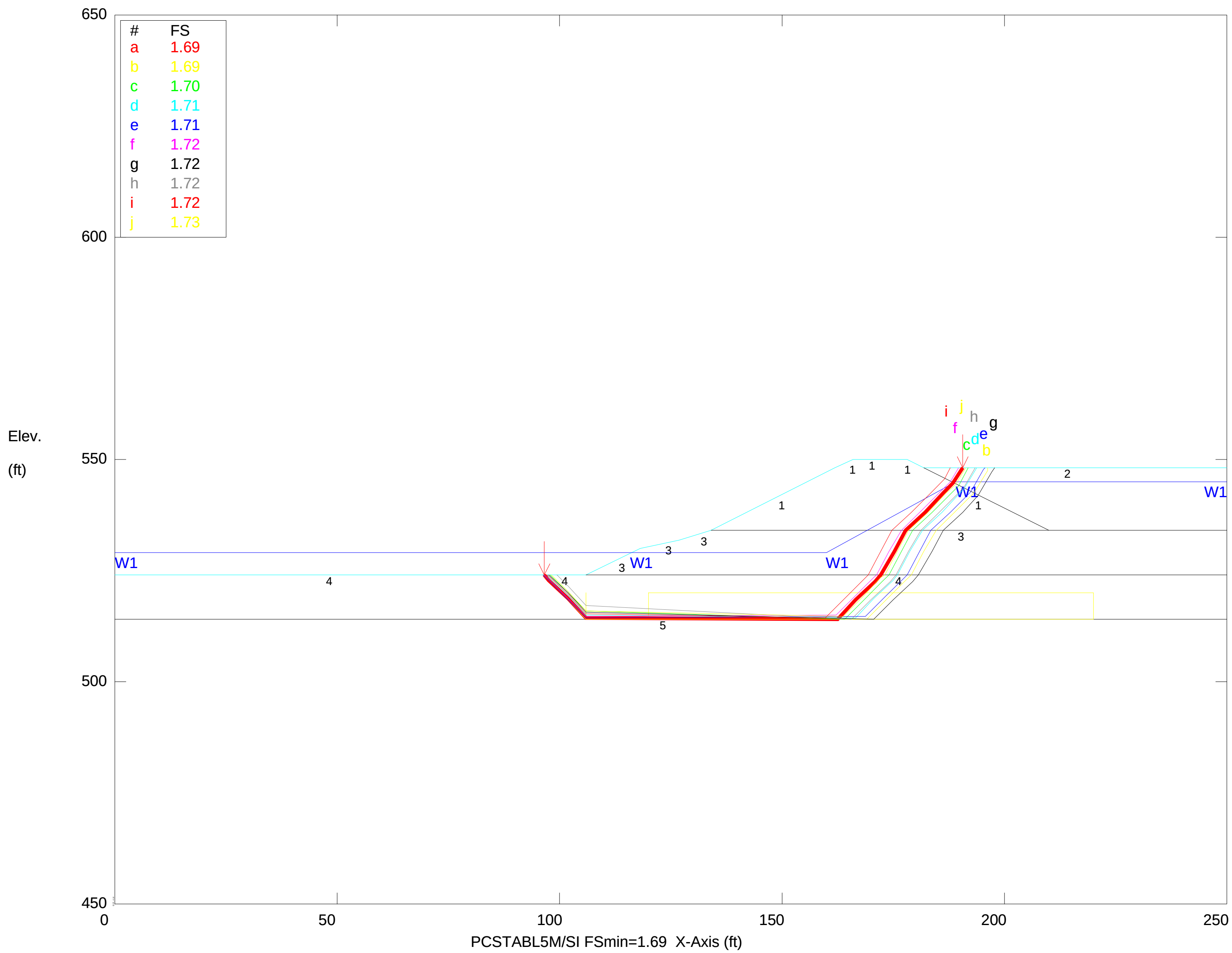
Ten Most Critical. C:BURL65B1.PLT By: TCW 05-27-11 11:00am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	DIKE	125	125	0	34	0	0	W1
2	ASH	120	120	0	34	0	0	W1
3	CLAY	125	125	1000	0	0	0	W1
4	ASH	120	120	0	32	0	0	W1
5	CLAY	125	125	1000	0	0	0	W1
6	ASH	120	120	0	32	0	0	W1
7	CLAY	125	125	600	0	0	0	W1
8	CLAY	125	125	600	0	0	0	W1
9	SAND	125	125	0	30	0	0	W1

Alliant Burlington Economizer Pile West, North Ash Slope - Static Case

Ten Most Critical. C:BURL70B.PLT By: TCW 05-31-11 2:32pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	1200	0	0	0	W1
2	Ash	120	120	0	28	0	0	W1
3	Ash Fdn	125	125	0	32	0	0	W1
4	Clay	125	125	700	0	0	0	W1
5	Sand	125	125	0	30	0	0	W1

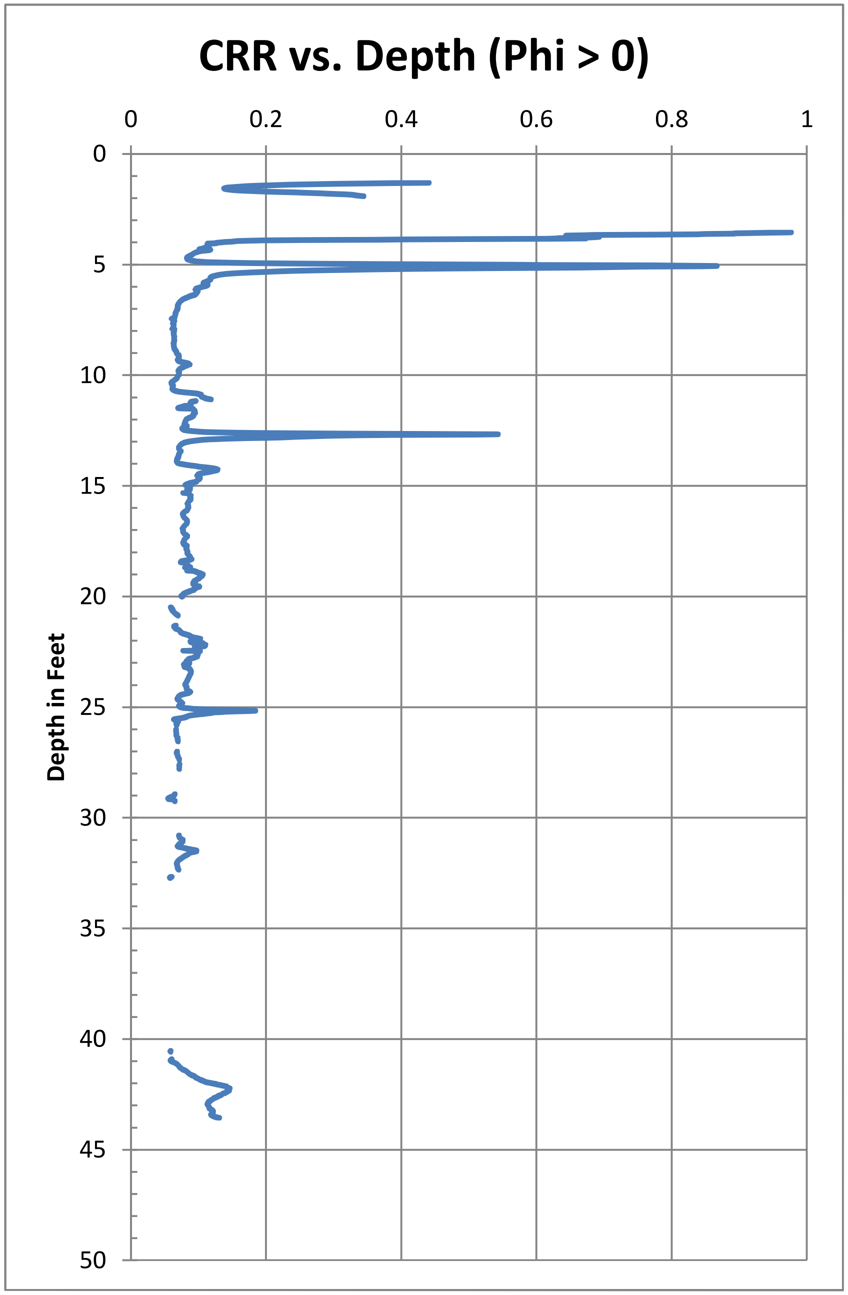
Attachment E

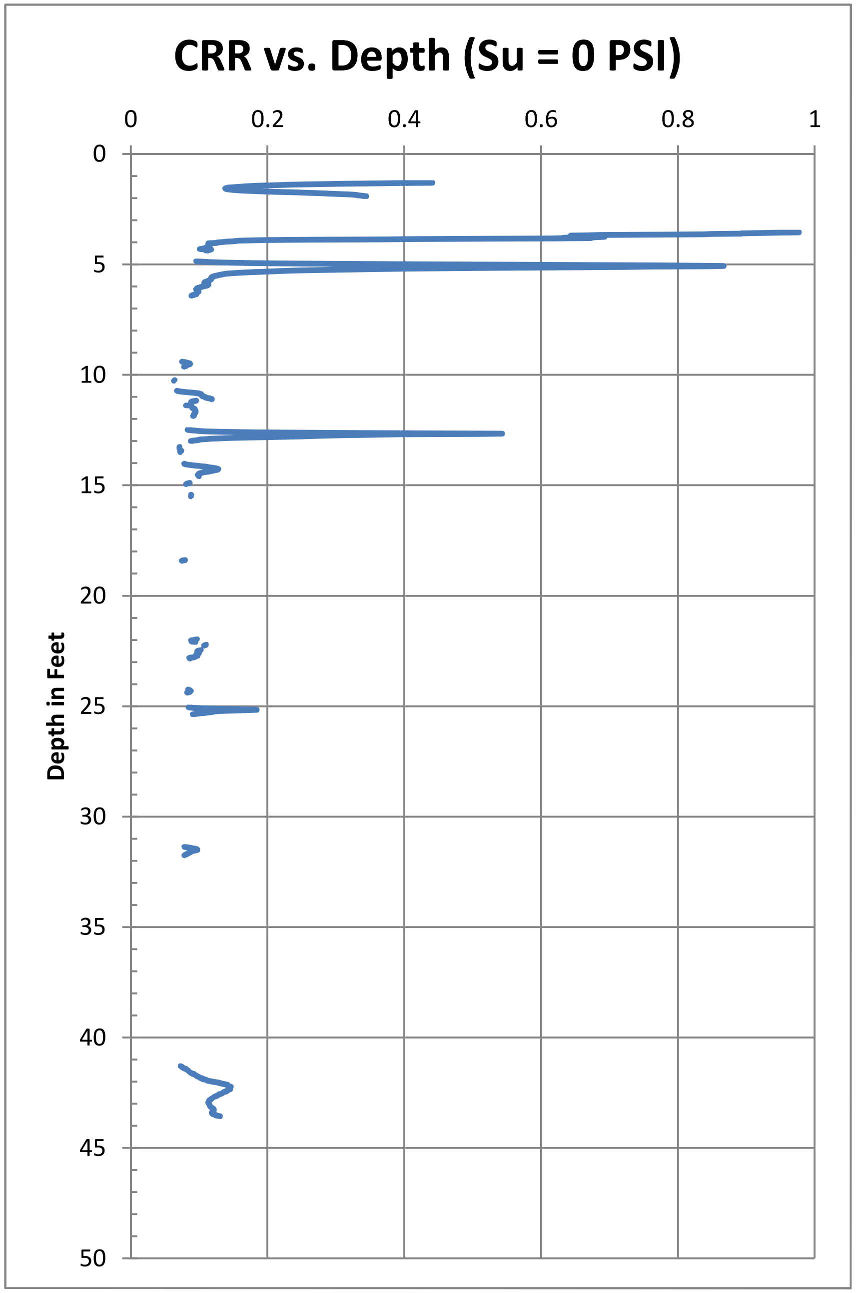
Cyclic Resistance Ratio (CRR)
and
Cyclic Stress Ratio (CSR)

Burlington Generating Station

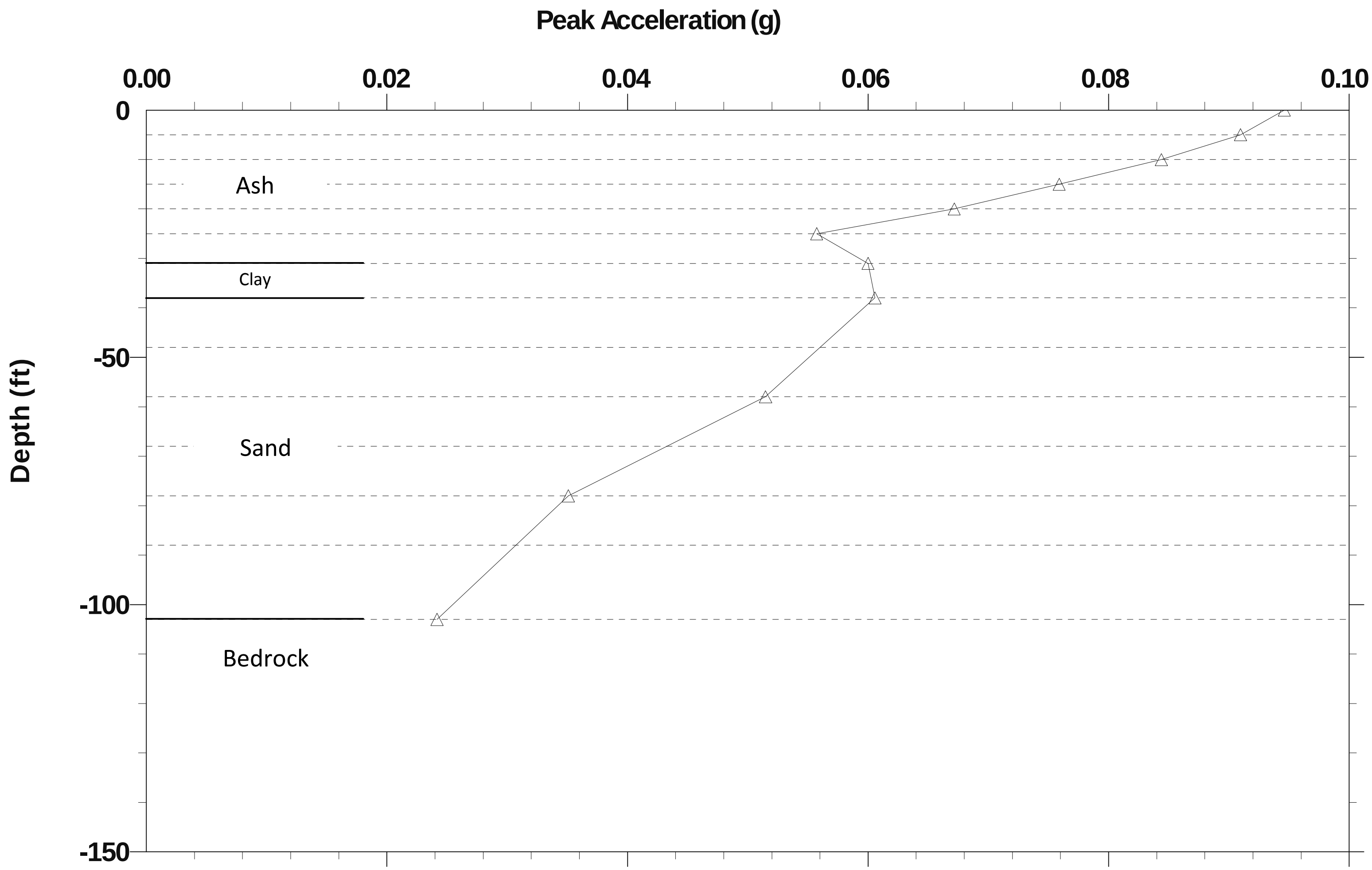
Source:
CRR based on CPT results by Aether dbs May 2011, and
Program SHAKE CSR calculations by Aether dbs May 2011

CPT-1
(Economizer Ash Pond Embankment)



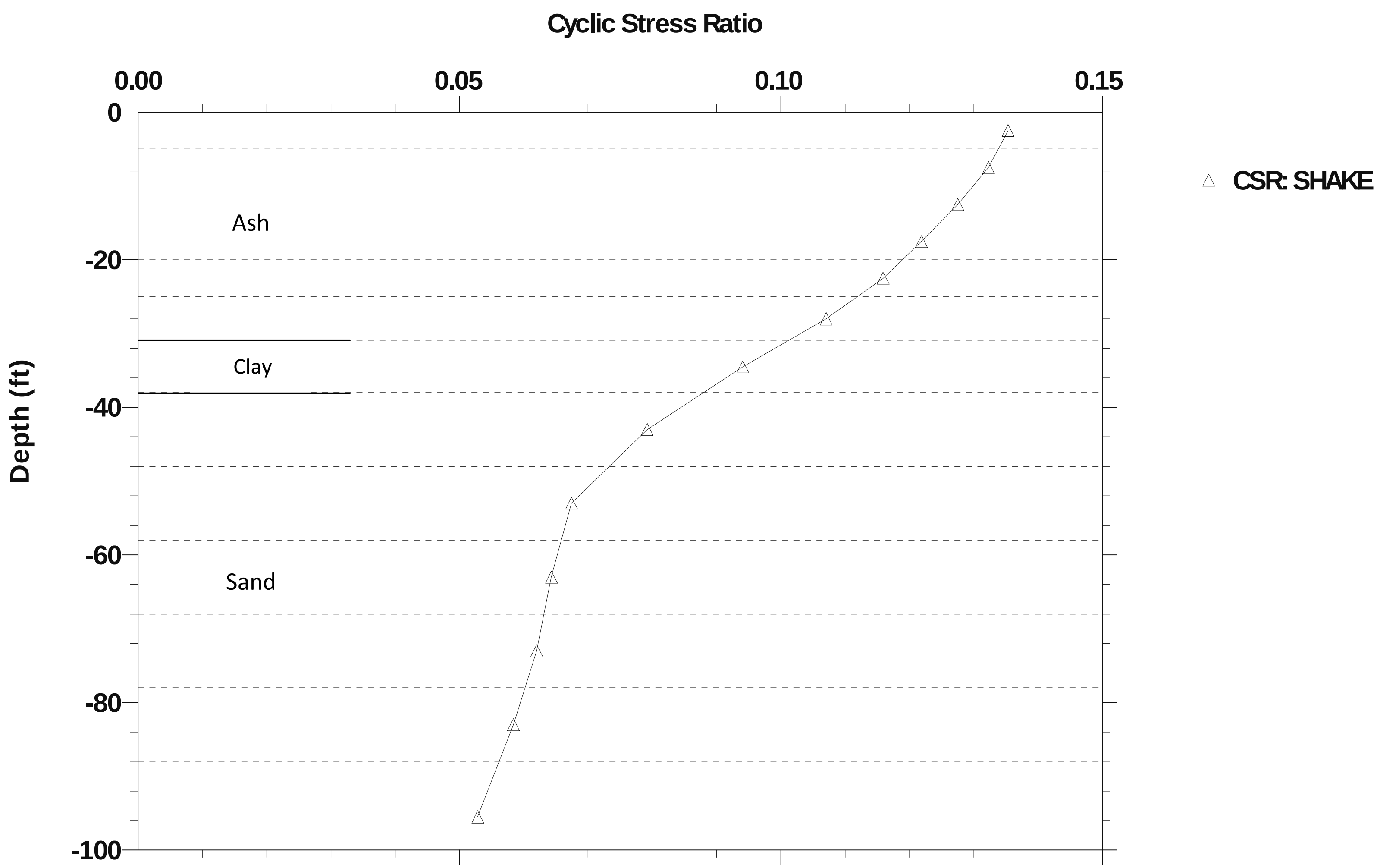


Economizer Ash Pile Sub-Surface Profile



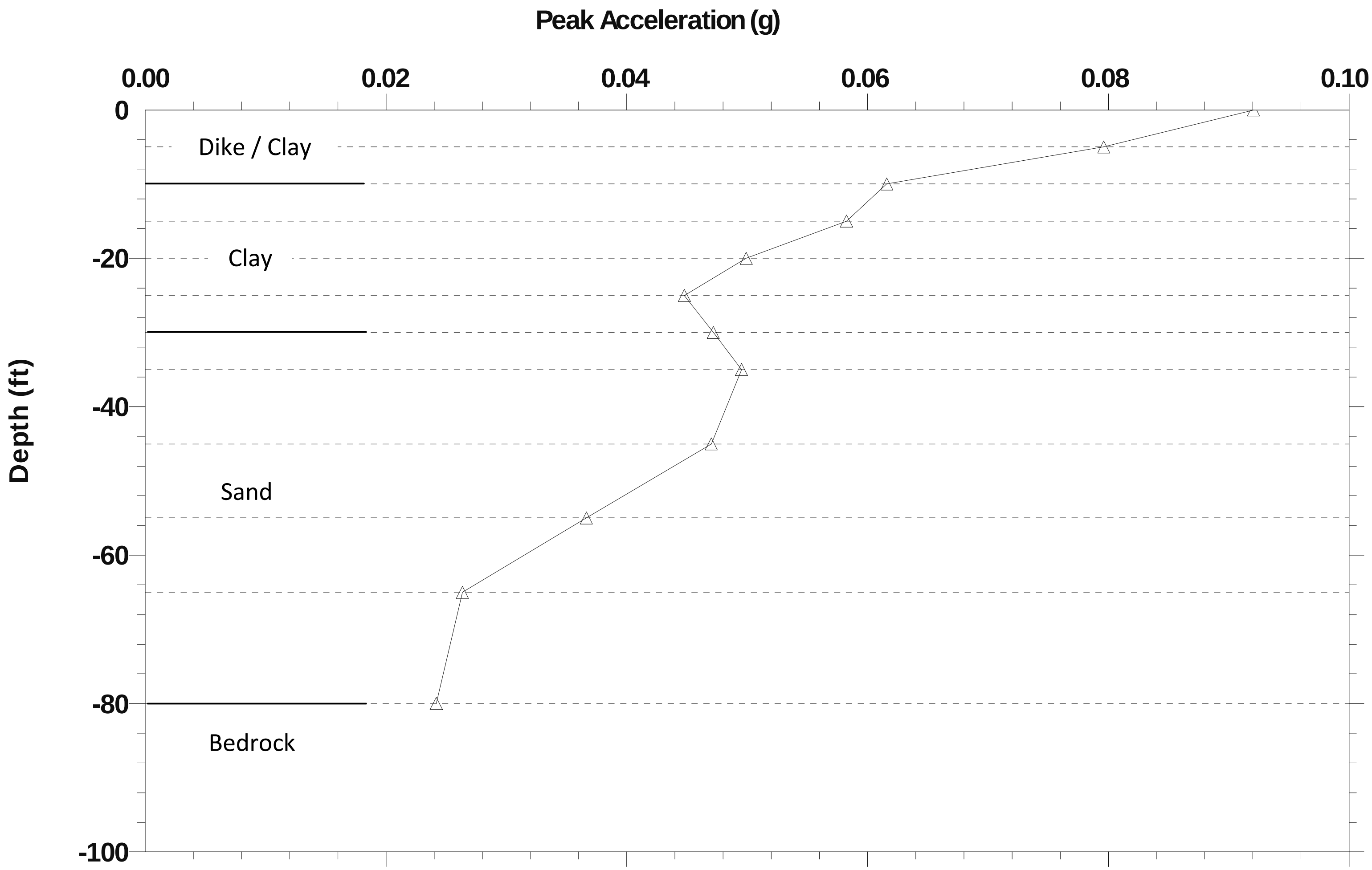
Acceleration with Depth (475 year return period with 0.025 g bedrock acceleration)

Economizer Ash Pile Sub-Surface Profile



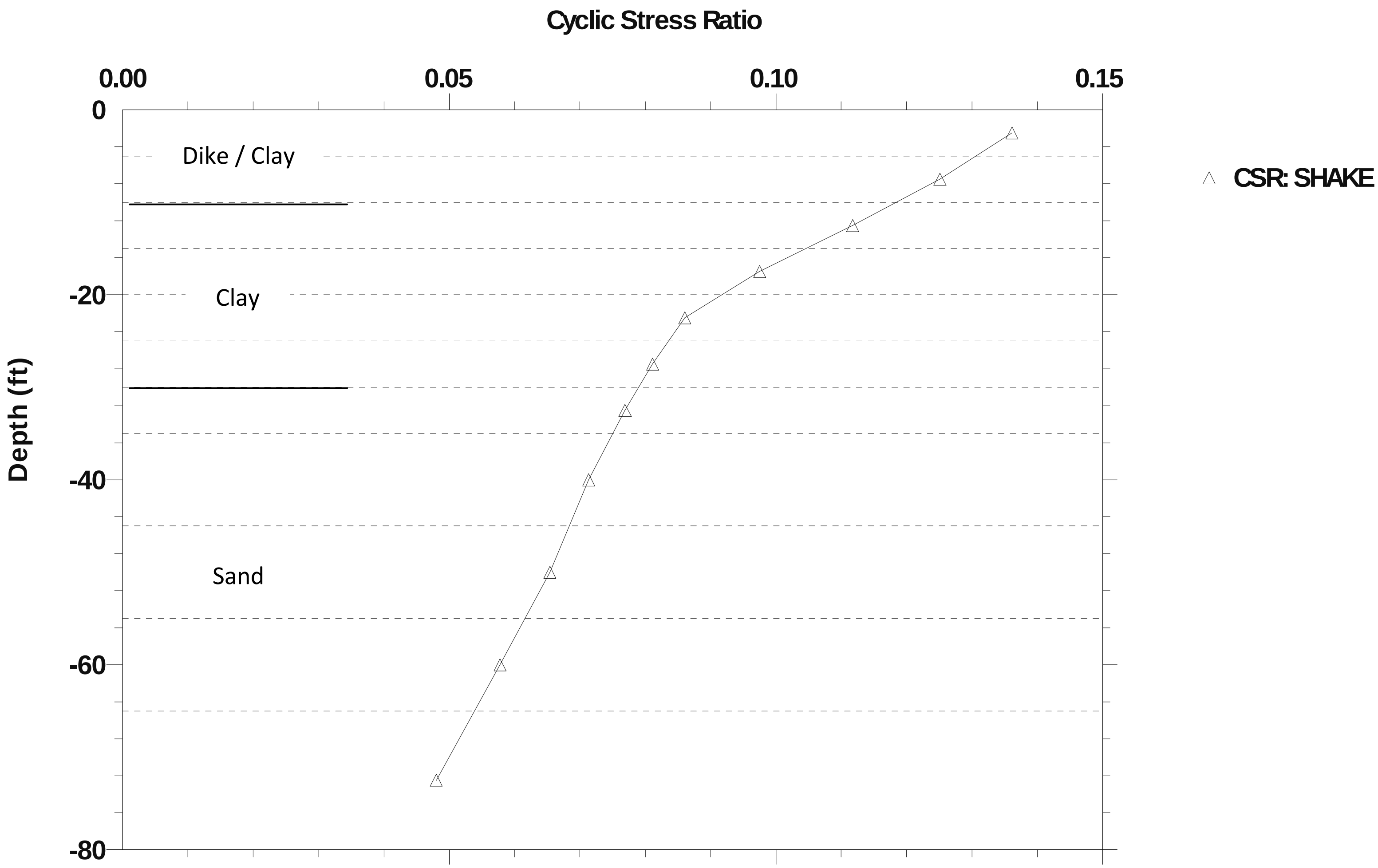
Cyclic Stress Ratio with Depth (475 year return period with 0.025 g bedrock acceleration)

Main Ash Pile Sub-Surface Profile



Acceleration with Depth (475 year return period with 0.025 g bedrock acceleration)

Main Ash Pile Sub-Surface Profile



Cyclic Stress Ratio with Depth (475 year return period with 0.025 g bedrock acceleration)

Attachment F

Dynamic / Pseudo-Static Slope Stability Analyses

Ten Most Critical Surfaces Per Analysis

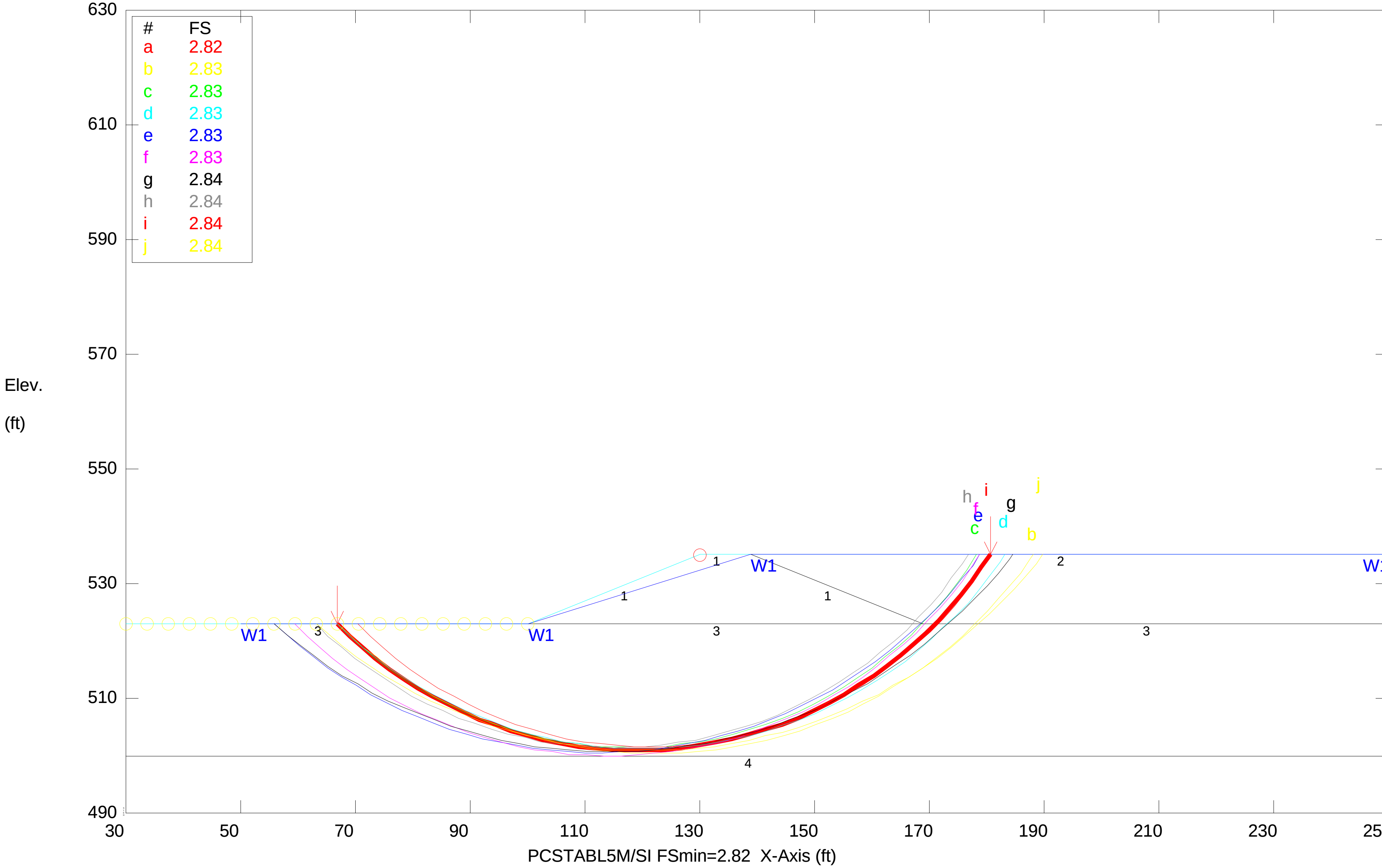
Burlington Generating Station

Source:

Program pcSTABL5m/SI output by Aether dbs May 2011

Alliant Burlington Main Ash Pond South Dike - EQ Case (0.077 & -0.051)

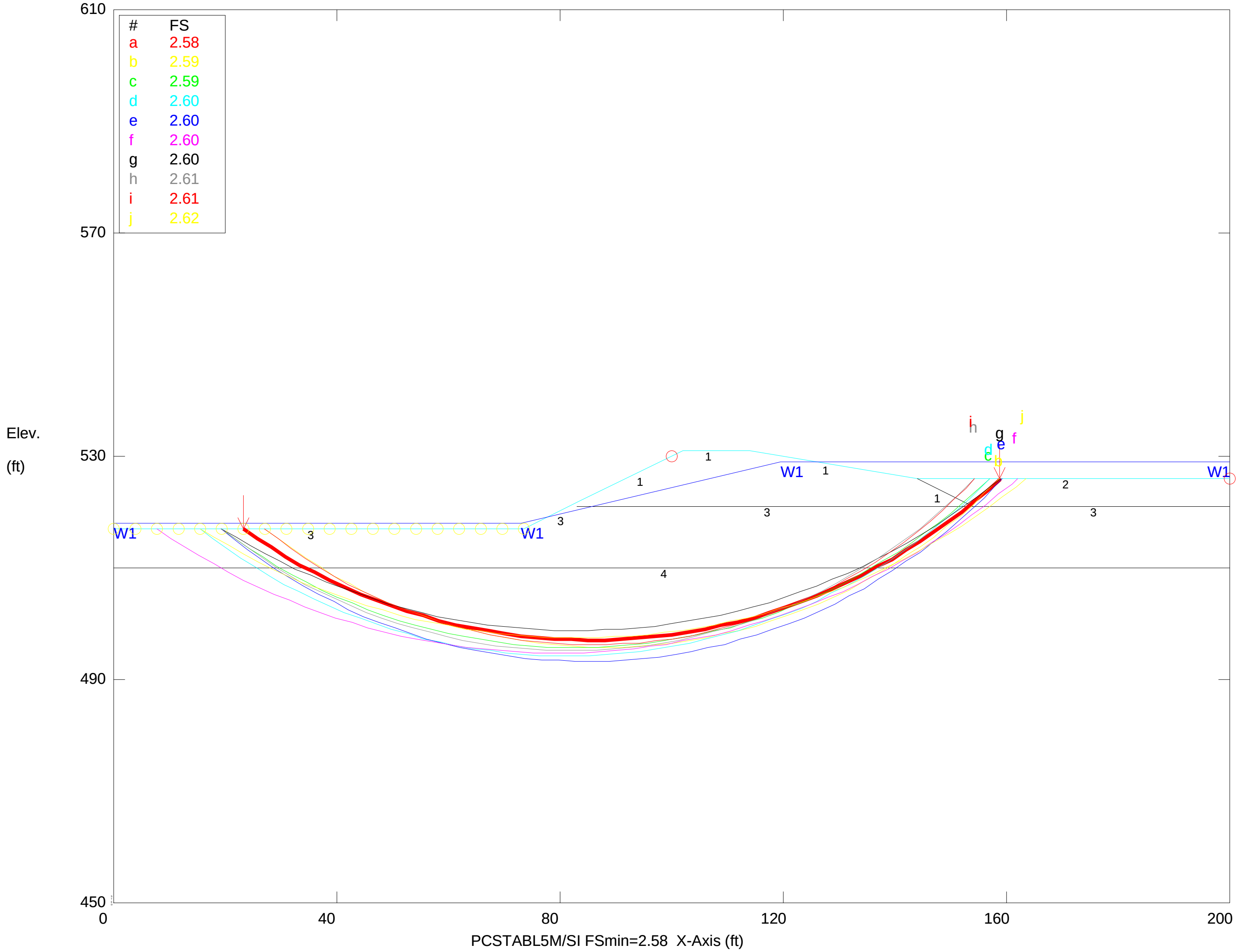
Ten Most Critical. C:BURL22C2.PLT By: TCW 05-31-11 7:42am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	700	0	0	0	W1
2	Ash	120	120	100	0	0	0	W1
3	Natural	120	120	1200	0	0	0	W1
4	Sand	130	130	0	37	0	0	W1

Alliant Burlington Upper Ash Pond North Dike Slope - EQ Case (.077 & .051)

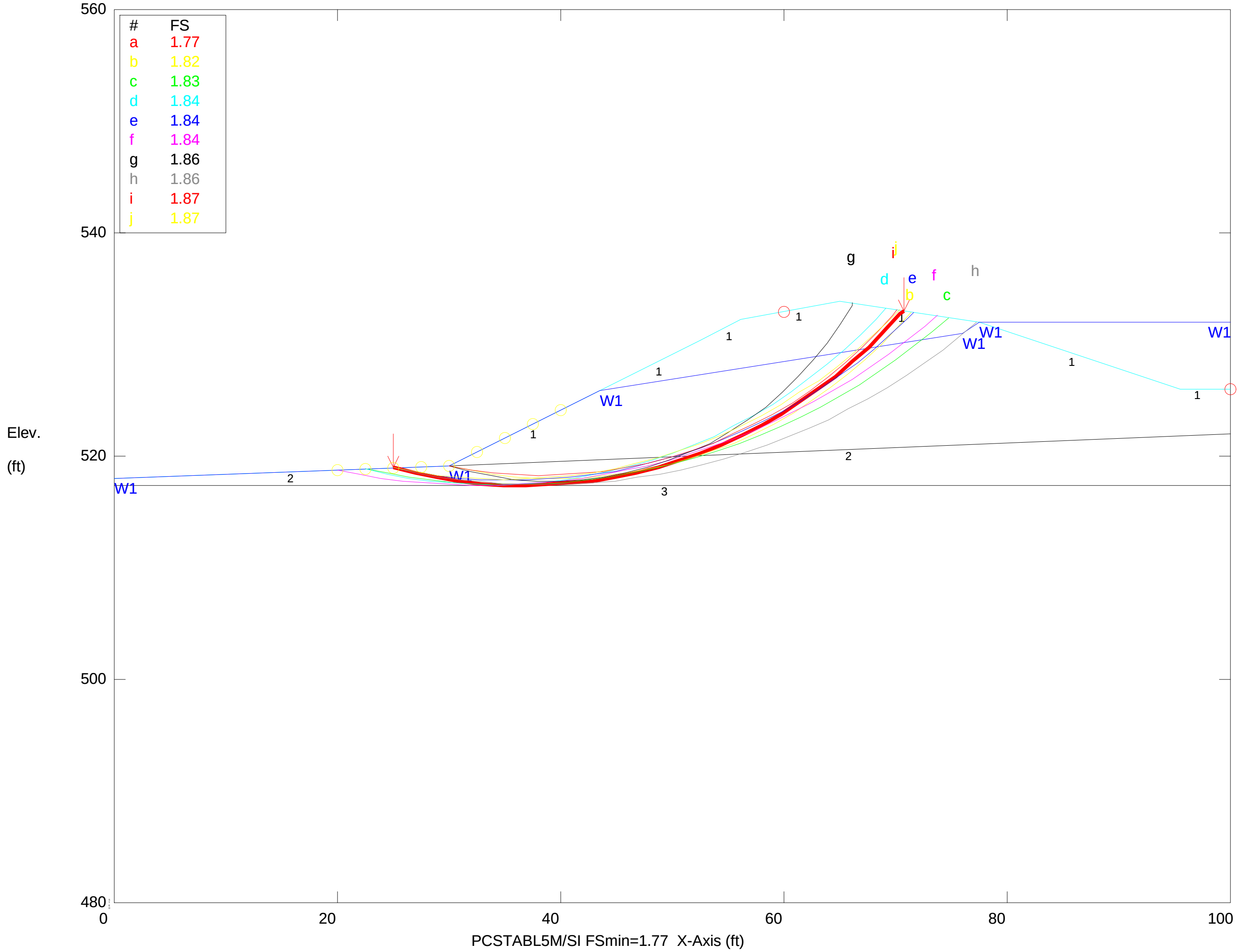
Ten Most Critical. E:BURL41C3.PLT By: TCW 05-29-11 1:45pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	130	130	1950	0	0	0	W1
2	Ash	120	120	100	0	0	0	W1
3	Clay	125	125	900	0	0	0	W1
4	Sand	125	125	0	35	0	0	W1

Alliant Burlington Ash Seal Pond South Dike - EQ Case (0.075 & -0.05)

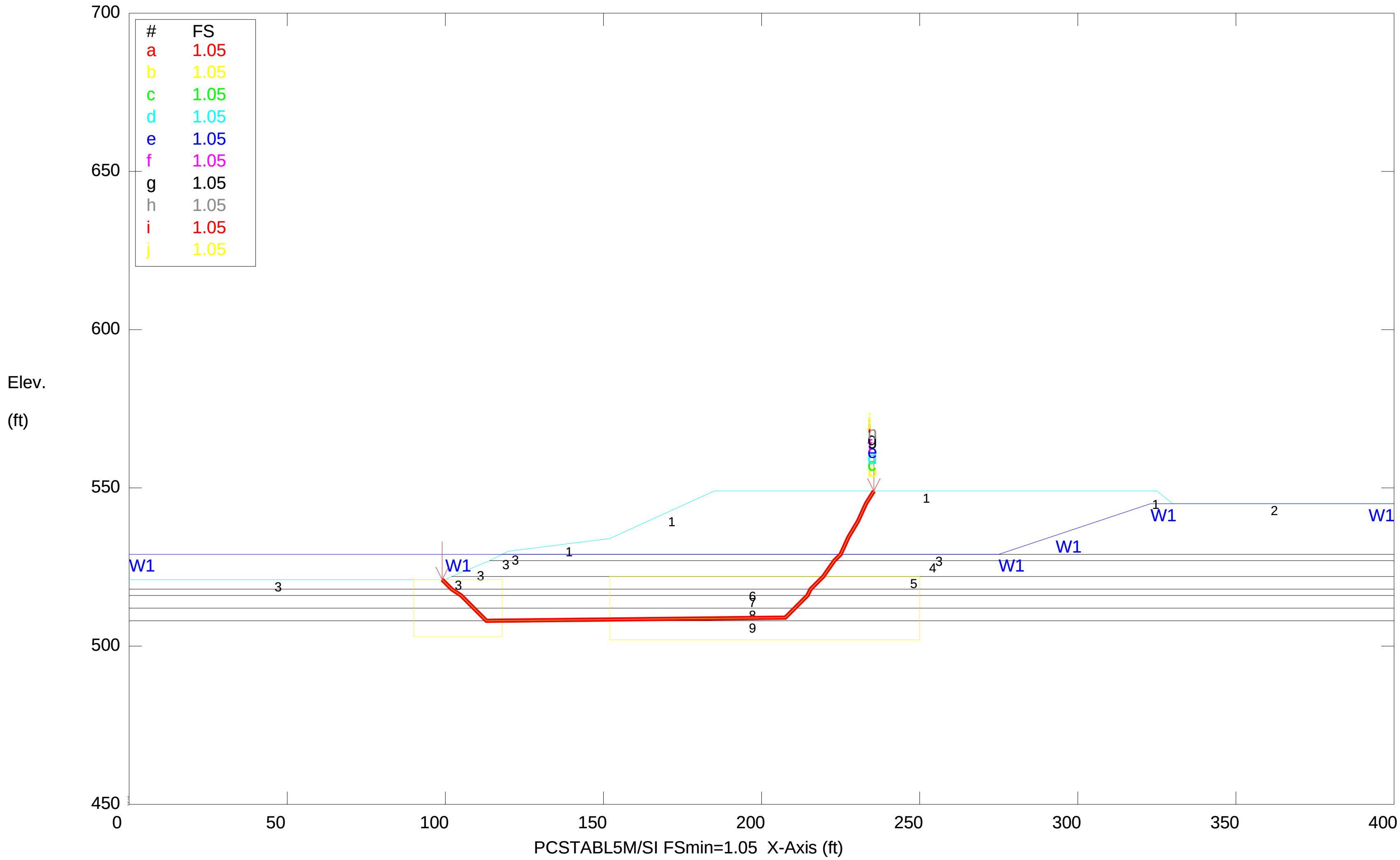
Ten Most Critical. E:BURL51C2.PLT By: TCW 05-29-11 3:53pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Clay	120	120	700	0	0	0	W1
2	Sand	130	130	0	37	0	0	W1
3	Clay	125	125	950	0	0	0	W1

Alliant Burlington Economizer Pile East, North Ash Slope - EQ Case (0.075 & -0.05)

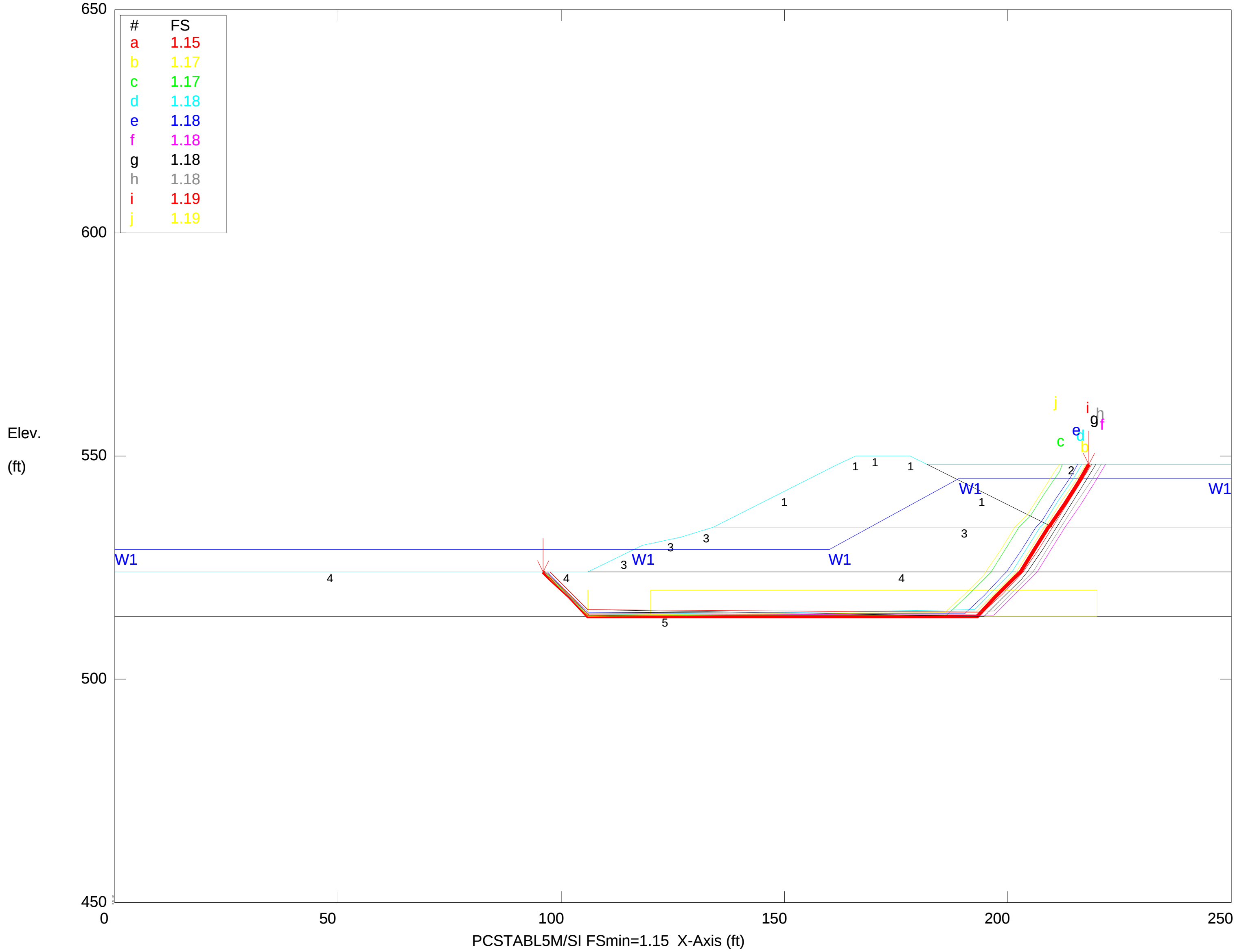
Ten Most Critical. C:BURL61B.PLT By: TCW 05-27-11 3:23pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	DIKE	125	125	0	34	0	0	W1
2	ASH	120	120	0	34	0	0	W1
3	CLAY	125	125	1000	0	0	0	W1
4	ASH	120	120	0	25	0	0	W1
5	CLAY	125	125	1000	0	0	0	W1
6	ASH	120	120	0	25	0	0	W1
7	CLAY	125	125	600	0	0	0	W1
8	CLAY	125	125	600	0	0	0	W1
9	SAND	125	125	0	30	0	0	W1

Alliant Burlington Economizer Pile West, North Ash Slope - EQ Case (0.075 & -0.05)

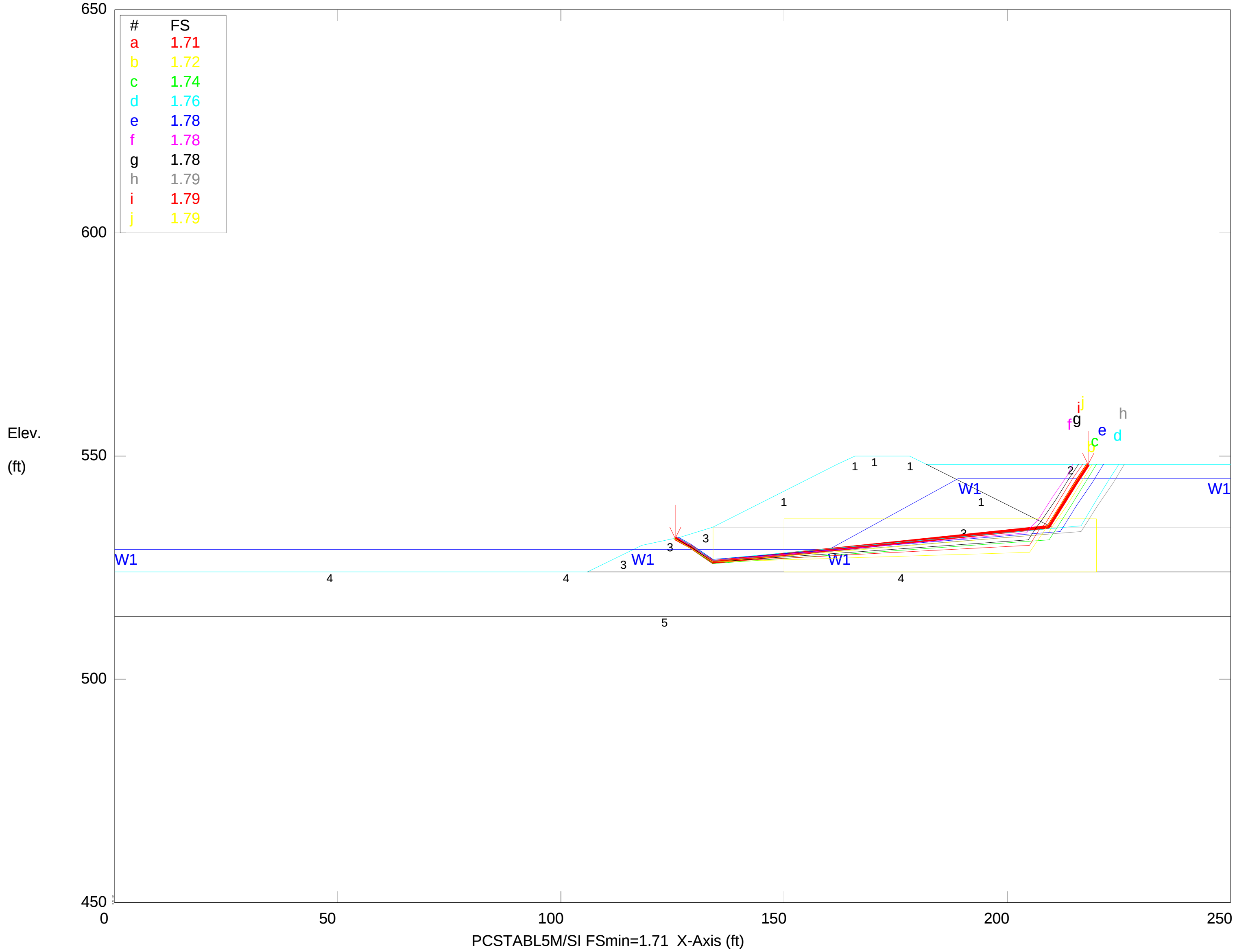
Ten Most Critical. C:BURL71B.PLT By: TCW 05-31-11 2:50pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	1200	0	0	0	W1
2	Ash	120	120	0	25	0	0	W1
3	Ash Fdn	125	125	0	25	0	0	W1
4	Clay	125	125	700	0	0	0	W1
5	Sand	125	125	0	30	0	0	W1

Alliant Burlington Economizer Pile West, North Ash Slope - EQ Case (0.075 & 0.05)

Ten Most Critical. C:BURL71B2.PLT By: TCW 05-31-11 2:57pm



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Dike	125	125	1200	0	0	0	W1
2	Ash	120	120	0	25	0	0	W1
3	Ash Fdn	125	125	0	25	0	0	W1
4	Clay	125	125	700	0	0	0	W1
5	Sand	125	125	0	30	0	0	W1